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CONSEIL PERMANENT INTERNATIONAL POUR
L'EXPLORATION DE LA MER

1829

RAPPORTS

ET

PROCÈS-VERBAUX DES RÉUNIONS

VOLUME LX

PROCÈS-VERBAUX

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TABLE DES MATIÈRES

PROCÈS-VERBAUX DES RÉUNIONS DU CONSEIL:

	Page
Vingt-deuxième réunion, Londres, Avril 1929	
Bureau, tableau des membres etc.	4— 7
Ordre du jour de la réunion	8
Procès-Verbal de la séance du 8 avril	9— 11
— - - — - 15 —	11— 17
Budget du Conseil pour 1929—30	17— 19
Liste des Comités	20— 25
Recommandations du Comité Consultatif	26— 29
Programmes et Rapports des Comités des Secteurs	30— 51
Comité du Secteur Nord-Est	30— 33
— - — Nord-Ouest	32— 35
— - Plateau Continental Atlantique	34— 39
— de la Mer du Nord	38— 45
— du Secteur de Transition	46— 47
— - — Baltique	48— 51
Comités combinés de la Baltique et du Secteur de Transition	50— 51
Programmes et Rapports des autres Comités	52— 57
Comité Hydrographique	52— 53
— du Plancton	52— 55
— Statistique	54— 55
— Limnologique	56— 57
— Éditorial	58— 61
— de la Baleine	62— 65
— des Engins Épargneurs	64— 67
Rapports des Réunions Scientifiques	68— 71
Fluctuations de la Pêcherie	68— 71
Mesures de Courants	70— 71

RAPPORT ADMINISTRATIF SUR LA VINGT-SEPTIÈME ANNÉE 1928—29:

Comptes rendus, séances etc.	72— 74
Travail du Bureau, Publications etc.	74— 76
Rapports des Comités des Secteurs	77—143
Comité du Secteur Nord-Est	77— 87
— - — Nord-Ouest	88— 90
— - Plateau Continental Atlantique	91— 94
— de la Mer du Nord	95—123
— du Secteur de Transition	124—134
— - — Baltique	135—144

VINGT-DEUXIÈME RÉUNION

LONDRES — AVRIL 1929

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M. J. Hjort, Vice-Président du Conseil.
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M. le Dr. ERIK MARTENS, *Göteborg.*

* Empêché à cause des obligations de service.
** Empêché d'assister à la réunion.

AGENDA

for the twentysecond meeting of the International Council for the Exploration of the Sea.

1. Opening of the Proceedings by the President.
2. Report as to the present participation.
3. Administrative Report.
4. Final Approval of the Accounts for 1927—1928.
5. Statement of Accounts for 1928—1929.
6. Arrangements for Scientific Meetings and adjustments, if any, of the circulated programme of proceedings.
7. Consideration of Reports and Programmes of the Committees.
8. Estimates for the financial year 1929—1930.
9. Nomination of the members of the Bureau, and the Finance Committee, and the Editorial Committee, and of the Editors, etc.
10. Time and place for the next Council Meeting.
11. Other business. Discussion of proposal of the Irish Free State for the revision of the existing scale of contributions in relation to the value of the fish landed in the participating countries, respectively.
12. Conclusion of the Meeting.

REPORT

of

the twentysecond Meeting of the Council.

First Sitting: Monday, April 8th, at 11,30 a. m.

The President, Mr. MAURICE, in the chair.
Present: The members and experts (vide list pp. 4—7).

Under **Point 1** of the Agenda the President formally opened the proceedings in the following words:—

Messieurs les Délégués et Experts,

J'ai l'honneur de déclarer ouverte la 22ième session du Conseil International pour l'Exploration de la Mer. Aussi ai-je le grand plaisir, au nom du Gouvernement de Sa Majesté, de vous souhaiter la bienvenue dans notre pays.

J'espère, Messieurs, que vous trouverez ici un lieu de réunion agréable. Nous avons voulu vous placer dans un milieu intéressant où, pendant votre séjour ici, vous pourriez vous considérer comme chez vous. On aurait pu vous donner autre part des salons plus spacieux, mais, à ce que je pense, moins pratiques au point de vue de la disposition et de la proximité des Comités en un seul étage. S'il vous manque quelque chose, dites le nous, et nous ferons notre mieux pour la fournir.

Je me permets de vous rappeler que c'est ici à Londres qu'a eu lieu la première réunion du Conseil après la grande guerre, et de constater que depuis cette réunion de 1920 le Conseil a éprouvé, non seulement en matière du nombre des pays adhérents mais aussi en matière de l'efficacité de ses travaux et l'autorité qu'on lui accorde, un accroissement véritablement remarquable.

Au nom du Conseil, j'ai le plaisir de souhaiter la bienvenue à un délégué qui siège entre nous pour la première fois, Mr. BRADLEY, délégué de l'Etat Libre d'Irlande. Et je me permets de joindre à son nom celui de Mr. CHARLES GREEN, qui nous a abandonné depuis si longtemps que nous sommes forcé malgré nous de le regarder à peu près comme un nouveau collègue. Nous sommes très contents de le voir siéger encore parmi nous. Mr. LIEBERT, qui nous est déjà bien connu, siège aujourd'hui pour la première fois comme délégué des Pays-Bas, dans laquelle qualité nous lui souhaitons la bienvenue.

Les nouveaux experts sont si nombreux que je m'excuse de les nommer. A tous les nouveaux venus je souhaite la bienvenue.

Je regrette beaucoup que nous manquons aujourd'hui de représentants de l'Italie et de la Lettonie. M. MAGRINI m'a informé par lettre qu'il est retenu par des affaires d'urgence et que M. l'Amiral Duc THAON DI REVEL est aussi empêché de nous joindre. De même, M. MIEZIS m'a indiqué l'impossibilité de son assistance. M. BAELS, délégué de la Belgique, aussi a été forcé de s'absenter.

Notre ami le Docteur SCHMIDT nous a envoyé par telegramme les bons souhaits de l'expédition Dana, dont nous lui rendrons vifs remerciments.

Messieurs, nous nous trouvons aujourd'hui loin de notre domicile de Copenhague. D'autant plus devons nous nous souvenir du pays de notre adoption et je suis certain que je suis l'interprète de vos voeux en vous proposant d'adresser, comme de coutume, par télégramme, nos hommages affectueux à Sa Majesté le Roi de Danemark.

M. THÉODORE TISSIER propose de transmettre au roi d'Angleterre les hommages du Conseil tout en exprimant des souhaits pour son rétablissement définitif. (Acclamations.)

Mr. MAURICE expressed the thanks of the British Delegation for this token of sympathy.

Points 2 of the Agenda. Report as to present participation.

The President reported that, as regards participation there was no change. Fourteen Governments were represented on the Council and Latvia continued to be a free member.

Point 3 of the Agenda. Administrative Report.

As the Administrative Report had only just been circulated the President proposed to give an opportunity for comment upon it at the final meeting.

Point 4 of the Agenda. Final approval of the accounts for 1927—28.

As the revision of the accounts had been delayed the final approval was postponed to the final Council Meeting.

Point 5 of the Agenda. Statement of Accounts for 1928—29.

The President stated that as the accounts for 1928—29 had only just been circulated, he proposed to defer further consideration of them to the next sitting. As last year an explanatory note as to the differences between the estimates and the accounts had been circulated.

Point 7 of the Agenda.

The President expressed the hope that it would be unnecessary to change the programme circulated. There might be minor additions which need not be discussed here. It would be necessary to fix the time for the Scientific Meetings.

Professor HJORT informed the members that twenty-two lectures had been announced for the biological meeting and urged that it would be necessary to start early and to ask the scientists to shorten their lectures as much as possible. It was agreed to start at 10 a.m. each day.

The President reminded the Council of the recommendation of the Consultative Committee last year that one day should be reserved for discussion of the Reports of the meetings of 1928 which had since been published. He had found it very difficult to find time for this discussion during the meeting in London and hoped that it would form part of the discussions with the Challenger Society at Plymouth.

Point 8 of the Agenda. Estimates for the financial year 1929—30.

A provisional Estimate had been distributed, but it provided only for ordinary routine services carried on from year to year. The discussion of the Estimates would

have to be postponed to the next sitting after the receipt of the recommendations from the various Committees.

All the other points of the Agenda were postponed to next sitting.

The meeting adjourned.

Second Sitting: Monday 15th, at 11 a.m.

The President, Mr. Maurice, in the chair.
Present: The members and experts (vide list pp. 4—7).

The President opened the meeting and stated that in accordance with the decision of the first sitting of the Council the following telegrams had been sent to and the following replies been received from Their Majesties the Kings of Great Britain and Denmark:

Telegrams sent:—

To H.M. The King of England.
The members of the International Council for the Exploration of the Sea assembled in London beg leave to present their respectful duty to Your Majesty and pray for the complete and speedy restoration of Your Majesty's health.

HENRY MAURICE, President,
London.

A sa Majesté le Roi de Danemark.
Les membres du Conseil International pour l'Exploration de la Mer réunis à Londres demandent la permission de témoigner à Votre Majesté leurs sentiments les plus respectueux.

MAURICE, Président,
London.

Replies received:—

HENRY MAURICE, President.
I am commanded by the King to thank the members of the International Council for the Exploration of the Sea assembled in London for their kind message and good wishes.

Equerry.

MAURICE, President International Council.
Mes remerciements sincères.

CHRISTIAN R.

Point 3 of the Agenda. Administrative Report.

The President reminded the members of the Council that at the first meeting he had proposed to give them an opportunity for comment upon the Administrative Report at the final meeting. The Report was adopted without correction.

Point 4 of the Agenda. Final approval of the accounts for 1927—28.

The accounts were finally approved.

Point 5 of the Agenda. Statement of Accounts for 1928—29.

The statement of accounts was approved.

Point 7 of the Agenda. Consideration of the Reports of Committees.

Editorial Committee. The President stated that the first proposal of the Committee had been instigated by the Bureau in order to reduce the cost of publications, and

yet to have as many useful reports as possible. He had himself taken part in the discussion in the Editorial Committee about this question. The proposal (see p. 58) was adopted.

With reference to the suggestion of the Editorial Committee that the selling price of the Council's publications should be reduced by one-third, the President suggested that the price should in future be indicated on the cover of each report.

It was agreed accordingly that the price of all publications should be reduced, on the basis of the prevailing scale of charges, by one-third, and that the price of each volume should be printed on the cover.

The publication of the papers recommended for publication by the Editorial Committee was approved.

Consultative Committee. Recommendation 1 of the Consultative Committee as to next years' Scientific Meetings was adopted (see p. 26).

The recommendations of all the Committees were adopted after the President had drawn attention to the expenditure involved. The new expenditure in support of recommendations of Committees proposed by the Bureau was:— (a) for illustrations of Atlantic Fauna (Atlantic Slope Committee, II, 13, p. 38) Kr. 4,000.00 instead of the unexpended vote of Kr. 3,000.00 from last year; (b) for the monthly distribution of offprints of the Bull. Hydr. (Combined North Sea Committee II, 1, p. 40); (c) for determination of Salinity Normals (Hydrographic Committee, 2, p. 52) Kr. 2,000.00 temporarily for assistance; (d) for preparation of a report on Salmon and Sea Trout (Limnological Committee, II, 1, p. 56) Kr. 3,000.00; (e) for experiments with fishing gears (Special Sub-Committee, II, p. 66) Kr. 3,000.00; (f) for binding of books etc. (Editorial Committee, p. 60) Kr. 800.00; (g) Publication of the following papers:— Reports of Scientific Meetings (Consultative Committee, A, 1 and B, 1, p. 26); Report by Chr. Hessle and S. Wallin: "Investigations of plankton and its fluctuations in the inner parts of the Baltic during the years 1925—27" (Baltic Committee, II, p. 50); Reports by Dr. Künne and by Professor Ostenfeld (Plankton Committee, II, 1 and 2, p. 54); Additional Tables to Bulletin Statistique (Statistical Committee, 2, p. 54); Report on Salmon and Sea Trout by Professor H. Henking (Limnological Committee, II, 1, p. 56); Index of Council's publications prepared by Prof. Ehrenbaum and a statistical paper by Dr. Eichelbaum (Editorial Committee, p. 60).

Some discussion arose with reference to par. 3 of the Report of the Statistical Committee, and it was agreed that the question of how and where the replies to the questionaire on fishery statistics should be published, should be deferred until replies had been received from all countries.

In accordance with the recommendation of the Combined North Sea Committee it was agreed that a congratulatory message be sent to Prof. Hardy asking him to continue his good work with his plankton apparatus.

Prof. Knudsen asked for the Councils confirmation of the election of a Hydrographic Sub-Committee pointing out that some travelling expenses might be required. It was agreed that the Sub-Committee could be called before the next Council Meeting by the Chairman, Prof. Schulz, subject to the President's approval, and that in that case the usual travelling expenses could be paid.

Point 8 of the Agenda. Estimates.

The President drew attention to the principal changes as follows:—

Kr. 1000 had been added to Head I, 5 for secretarial assistance to the Editor of the Journal.

Travelling expenses had been raised by Kr. 2000 in anticipation of extra expenses involved by meetings of experts studying Saving Gears, the experts appointed to take stock of progress in the North Sea, and the Hydrographic Sub-Committee.

The President expressed the hope that the expenses of these meetings might, for the rest, be met by economies on this sub-head in other directions.

Printing and Distribution. On consideration of the proposals of the Committees as to papers to be published the Bureau thought it necessary to raise the Estimate to Kr. 53,500 but they hoped that, as a result of the new rules and regulations about the production of reports, this maximum would not be reached.

The President pointed out that the total estimated expenditure, after deducting Kr. 10,607 chargeable to the Reserve Fund in respect of Mrs. Drechsel's pension and the work of the Tidal Institute of Liverpool, exceeded the estimated revenue by Kr. 6,261. The Reserve Fund was considerable, but it would be necessary to make a serious effort to keep the expenditure of following years within the limits of revenue. He pointed out further that if the participating Governments agree to the Council's proposal about the Irish contribution (se point 11 (a) below), the excess of the estimated expenditure over revenue would be increased by Kr. 5,000.

Point 9 of the Agenda. Nomination of the Bureau and the Finance Committee and the Editorial Committee, and of the Editors etc.

The following were nominated members of the Finance Committee:— The President, *ex officio*, Prof. Knudsen and Prof. Schmidt as permanent members and Mr. Bradley, Mr. Lecourbe and Mr. Asserson.

The Editorial Committee with Prof. Pettersson as Chairman was re-elected.

Prof. D'Arcy Thompson and Dr. E. S. Russell were re-elected as Editors for the Bulletin Statistique and the Journal respectively.

On the proposal of Prof. Odón de Buen seconded by Dr. Tesch the Bureau was re-elected as a whole. The President briefly thanked the Council for the renewal of their confidence in the Bureau.

Point 10 of the Agenda. It was agreed to hold the next meeting of the Council in Copenhagen at the end of May or the beginning of June 1930.

Point 11 of the Agenda. Other business.

A number of subjects came up for consideration under this head, as follows:—

a) *The Irish proposal that the existing scale of contributions should be revised in relation to the value of the fish landed in the participating countries.*

The President pointed out that such an arrangement would raise many embarrassing questions, and the Bureau, therefore, had invited Mr. Bradley to discuss the subject with them. They had arrived at a proposal which they hoped would be accepted by the Council, and which Mr. Bradley said would be acceptable to him. Of course,

a question of this kind could only be decided by the Governments of the participating Countries and, therefore, if these proposals were approved it would be a recommendation of the Council to the Governments.

The suggestion of the Bureau was that the Irish Free State might be treated as an exceptional case, inasmuch as it was a country now sitting with the Council as an independent unit which had formerly been represented as a part of another country which was still a Member of the Council. Before the Irish Treaty representatives from Ireland had sat with the Council as colleagues of the British Delegates; the only practical difference arising out the changed conditions was that the Irish Free State was represented by Delegates instead of by Experts only, and that while what was formerly the United Kingdom had contributed Kr. 20,000 for the two countries as one, the two countries, now separated were called upon to pay Kr. 30,000, by which the Council gained Kr. 10,000. The Free State Government did not consider that the present importance of their fisheries was such as to justify them in contributing on the scale of Kr. 10,000 per annum at a time when they were seeking economies wherever they could find them. They hoped to develop their fisheries, and the Council might reasonably take the view that the work of the Council would help towards that development, and that membership of it was, therefore, worth paying for. On the other hand, the Council would readily recognise that it must be a matter of time and one of some difficulty to adjust the finances of a country which had so recently achieved an independent status. The Bureau, therefore, taking into consideration the peculiarity of the case of a State created by separation from a State already participating, recommended that, as a purely temporary measure, the contribution of the Irish Free State should be reduced to Kr. 5,000 per annum, and that a recommendation to this effect should be submitted to the participating Governments. This was approved by the Council.

Mr. BRADLEY thanked the Council for their approval and expressed the hope that the time was not far distant when the Irish Free State would feel justified in paying the standard contribution of Kr. 10,000.

b) Contribution to Prof. Gilson's work.

It was agreed that following the practice of the last three years the Council should pay a sum of Kr. 2,500 to Belgium as a contribution to the expenses of Prof. GILSON's work.

c) The effect of oil in sea water on fish life.

The President stated that in accordance with the request of the Council at its last annual meeting Prof. O. DE BUEN had furnished a memorandum concerning his enquiries as to the effect of oil in sea-water on fisheries. Prof. O. DE BUEN had drawn up certain tentative conclusions and had made suggestions for further enquiries in the following terms:—

L'intervention du Conseil International pour l'Exploration de la Mer, vu le problème de la pollution des eaux par le pétrole et les huiles lourdes, devrait avoir pour tâche de recommander aux Délégués des divers Pays:

a) que dans les laboratoires littoraux et par les services respectifs de pêche on réalisât en grand des expériences faites par une rigoureuse méthode scientifique et qu'on réunît ces observations et

ces renseignements afin de voir exactement l'étendue des dangers que peut avoir pour la faune marine, directement ou indirectement, la pollution des eaux par le pétrole et les huiles lourdes.

b) que les résultats de ces expériences des observations et des renseignements pris, se transmissent au Conseil pour qu'une Commission compétente les juge, les range et les divulgue.

Prof. O. DE BUEN dit qu'il n'avait reçu que des rapports de quelques pays participants, et que ces rapports dépendaient des sources empiriques. Il manque des observations précises et scientifiques. Il suggère de publier le mémorandum et de nommer plus tard une commission.

It was agreed that Prof. O. DE BUEN's memorandum should be circulated to all Delegates, and that the question of appointing a Committee should be reserved pending the receipt of the reports of further enquiries.

d) Consideration of progress made and future lines of work.

The President said that the Bureau had had a serious discussion as to how the Council could best meet the questions which sooner or later have to be faced: "What are you doing? What is your practical aim?" The Bureau had come to the conclusion that the best way to answer these questions was to put themselves in a position to state with precision what had been done, in short there should be a "stocktaking". The first step, at any rate, would be to take stock of the progress made. This could obviously not be done at one time for the whole area in which the investigations were carried out, and they therefore proposed to the Council to confine the enquiry in the first place to the North Sea. The suggestion was to invite the experts chiefly responsible for investigations in that area; namely Messrs. BOWMAN, RUSSELL, TESCH, GILSON, MIELCK, JOHANSEN, LE DANOIS and ANDERSSON each to prepare a very short paper in which he would endeavour to answer the following questions:— (1) In what respects can we show definite progress and what stage have we reached? (2) In what respects is there lack of progress and gaps in our information which are an obstacle to the formulation of conclusions? and (3) have you arrived at any definite conclusions as to what would be the best method of approaching the question of protection of fisheries where necessary? These Reports should be sent to the Chairman of the Consultative Committee some time before the autumn meeting of the Bureau, and if the Chairman thought fit a meeting could be arranged for discussion of the results. The Bureau further suggested that Prof. HJORT should be invited to draw up a comprehensive memorandum based upon the reports of the individual experts. The proposal was adopted.

Point 12 of the Agenda. Conclusion of the Meeting.

On the motion of Prof. D'ARCY THOMPSON it was agreed to send a telegram to Sir RAY LANKESTER, the founder of the Laboratory at Plymouth, greeting him before the conclusion of the meeting and before visiting Plymouth[1]).

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[1]) The telegram was sent in the following terms:—

Sir EDWIN RAY LANKESTER, K. C. B.,
44, Oakley Street, Chelsea, S.W. 3.

The International Council for the Exploration of the Sea at the conclusion of its meeting in London and about to visit the Station of the Marine Biological Association at Plymouth sends greetings to the Founder and President of the Association.

MAURICE, President.

M. Théodore Tissier dit qu'il est sûr d'être l'interprète de tous les membres du Conseil en proposant que le Président soit chargé de transmettre les remerciements du Conseil au Gouvernement de la Grande Bretagne et au Lord Great Chamberlain pour l'accueil fait au Conseil à Londres et spécialement à la chambre des Lords. Il ne trouve que l'hospitalité anglaise n'a rien à envier à celle de l'Ecosse si renommée. (Agreed by acclamation).

Prof. Pettersson proposed that the thanks of the Council be accorded to the Zoological Society of London. Agreed by acclamation.

The President proposed a vote of thanks to the Great Western Railway Co. Agreed unanimously.

On the motion of the President a hearty vote of thanks was accorded to the members of the staff for their work in connection with the meeting.

ESTIMATES

of

the International Council for the Study of the Sea for the financial year 1929—30.

Receipts:—

Head	No.	Item	Kroner	Kroner
I	1	**BALANCE** on the 31st March 1929 constituting the reserve of the Council		176,103,75 [1]
		ORDINARY RECEIPTS:—		
II	2	**Annual Contributions of the Governments**	172,000,00	
III	3	**Interest on bank deposit** ..... estimated	4,000,00	
IV	4	**Interest on Treasury Bonds**	3,500,00	
V	5	**Sale of publications** ..... estimated	1,000,00	180,500,00
		Total Receipts...		356,603,75

[1]) **Balance:—**
Kr. 68,118,05 Danish Treasury Bills.
„ 107,985,70 Cash and deposited in the Handelsbank.
Kr. 176,103,75

Expenditure:—

Head	No.	Item	Kroner	Kroner
I		**ORDINARY EXPENDITURE:—**		
		Incidental expenses:—		
	1	President	6,000,00	
	2	Chairman of the Editorial Committee	2,000,00	
	3	Hydrographic Consultant	3,000,00	
	4	Editor for Statistics	2,000,00	
	5	Editor of the Journal	4,000,00	
			17,000,00	17,000,00
II		**Administrative Staff:—**		
	6	Administrative Secretary	13,200,00	
	7	1st Assistant Secretary	6,000,00	
	8	2nd Assistant Secretary	4,500,00	
	9	Hydrographic Staff	13,000,00	
	10	Statistical Assistant	4,000,00	
			40,700,00	40,700,00
III		**Expenses of the office in Copenhagen:—**		
	11	Rent, service, heating, stationery, books, binding of books, light, gas, telephone, telegrams, insurance, postage, freights, typewriting and miscellaneous expenses	15,000,00	15,000,00
IV	12	**Travelling expenses**	15,000,00	15,000,00
V	13	**Chairmen of Committees**	29,000,00	29,000,00
VI	14	**Printing and distribution**	53,500,00	53,500,00
VII	15	**Transferred to Pension Fund** [2])	3,500,00	3,500,00
		to carry forward...		173,700,00

[2]) The pension fund is not included in the balance.

Head	No.	Item	Kroner	Kroner
		Brought forward...		173,700,00
VIII		**EXTRAORDINARY EXPENDITURE:—**		
	16	**Special Resolutions:—**		
		Mrs. Drechsel's pension	6,500,00 [1])	
		Tidal Institute	4,107,00 [1])	
		Investigations of Plankton Nets (unexpended vote from last year)	1,661,00	
		Hydrographic charts (unexpended vote from last year)	600,00	
		Prof. Joubin's Illustrations of Atlantic Fauna	4,000,00	
		Assistance for Determination of Salinity Normals	2,000,00	
		Prof. Henking's Report on Salmon and Sea Trout	3,000,00	
		Experiments with Fishing Gear	3,000,00	
		Prof. Gilson's work	2,500,00	
		Binding of books	800,00	28,168,00
		Total Expenditures...		201,868,00

[1]) Chargeable to the reserves of the Council.

Annual Contributions of the Governments:—

Belgium	5,000,00
Great Britain	20,000,00
Denmark	10,000,00
Finland	5,000,00
France	20,000,00
Germany	20,000,00
Irish Free State	5,000,00
Italy	20,000,00
Netherlands	10,000,00
Norway	10,000,00
Poland	10,000,00
Portugal	5,000,00
Spain	20,000,00
Sweden	10,000,00
Latvia	2,000,00
Kr....	172,000,00

Special Reserve for Pensions.

Cash in hand at 31st March 1929	Kr.	10,872,48
Interests from Treasury Bills falling due in 1929—30	-	3,500,00
Interests from the Special Reserve itself	ca. -	600,00
	ca. Kr.	14,972,48

ESTIMATES *)

of

Publications to be printed during the financial year 1929—30.

Series	Subject	Authorisation	Estimated cost Kroner	Remarks
Rapp. & Proc.-Verb.	Whales and Plankton in the North Atlantic	Bureau	7,200.00	in print
—	North-Western Area Report	Pr.-Verb. Vol. XLIX p. 12	5,000.00	in print
—	Proc.-Verbaux 1929	Standing order	3,200.00	
—	Rapport Atlantique	Pr.-Verb. Vol. XXVIII p. 30	2,000.00	
—	Reports of the Scientific Meetings	Pr.-Verb. current issue p. 12	5,000.00	
—	Index of Council's Publications	Pr.-Verb. current issue p. 12	1,200.00	
—	Statistics	Pr.-Verb. current issue p. 12	1,700.00	
—	Salmon and Sea Trout	Pr.-Verb. current issue p. 12	2,500.00	
—	Plankton	Pr.-Verb. current issue p. 12	2,000.00	
—	Plankton in the Baltic	Pr.-Verb.current issue p. 12	1,700.00	
—	Catching power of plankton nets	Pr.-Verb. current issue p. 54	0.00	to be paid by the unexpended vote from last year under Special Resolutions
Bulletin	Hydrographique	Standing orders	5,000.00	
—	Offprints of Bull. Hydr. for monthly distribution	Pr.-Verb. current issue p. 12	1,250.00	
—	Statistique	Standing orders	1,750.00	
Journal du Conseil	Vol. IV, Nos. 2 & 3 Vol. V, No. 1	— —	9,000.00	
		Total...	Kr. 48,500.00	

Other costs of publication:	
Translations, drawings etc....	Kr. 2,000.00
Distribution.....	- 3,000.00
	Kr. 53,500.00

*) NB. These Estimates are framed as closely as the conditions permit, but are inevitably subject to considerable variation according to the ultimate cost of production.

List of Members of Committees.

Consultative Committee.

Professor Johan Hjort, chairman,
Mr. Oscar Sund,
Professor Johs. Schmidt,
Dr. Ed. le Danois,
Professor Rafael de Buen,
Mr. David T. Jones,
Prof. G. Gilson,
Prof. W. Mielck,
Dr. A. Bowman,
Mr. J. O. Borley,
Dr. A. C. Johansen,
Dr. K. A. Andersson,
Professor Martin Knudsen,
Professor C. H. Ostenfeld,
Professor D'Arcy W. Thompson,
Professor H. Henking,
Dr. E. S. Russell.

North Eastern Area Committee.

Norway:	Professor Johan Hjort, chairman,
	Mr. Oscar Sund, vice-chairman,
	Mr. S. K. Asserson,
Denmark:	Professor Johs. Schmidt,
England:	Dr. E. S. Russell,
France:	Commandant Charcot,
	failing him Dr. Ed. le Danois,
Germany:	Mr. H. Lübbert,
Scotland:	Dr. R. S. Clark,
Sweden:	Dr. K. A. Andersson,
	Dr. G. Ekman.

North Western Area Committee.

Denmark:	Professor JOHS. SCHMIDT, chairman,
England:	Dr. E. S. RUSSELL,
France:	Dr. ED. LE DANOIS,
Germany:	Professor E. EHRENBAUM,
Norway:	Mr. OSCAR SUND,
Scotland:	Dr. A. BOWMAN.

Atlantic Slope Committee.

France:	Dr. ED. LE DANOIS, chairman,
	Professor L. JOUBIN,
	Professor L. ROULE,
Spain:	Professor RAFAEL DE BUEN, vice-chairman,
	Professor JOSÉ GIRAL,
England:	Dr. E. J. ALLEN,
	Dr. E. S. RUSSELL,
Germany:	Professor G. SCHOTT,
Irish Free State:	Mr. G. P. FARRAN,
Italy:	Professor G. MAGRINI,
Portugal:	Dr. A. RAMALHO.

Combined North Sea Committee.

Mr. DAVID T. JONES, chairman,
Professor G. GILSON, vice-chairman.

Northern North Sea Committee.

Scotland:	Dr. A. BOWMAN, chairman,
Denmark:	Professor JOHS. SCHMIDT,
England:	Mr. F. M. DAVIS,
France:	Mr. J. LE GALL,
Germany:	Professor E. EHRENBAUM,
Holland:	Dr. J. J. TESCH,
Norway:	Mr. OSCAR SUND,
Poland:	Mr. J. BOROWIK,
Sweden:	Professor O. PETTERSSON,
	Dr. A. R. MOLANDER.

Southern North Sea Committee.

Germany:	Professor W. Mielck, chairman,
Belgium:	Professor G. Gilson,
Denmark:	Dr. A. C. Johansen,
England:	Mr. F. M. Davis,
France:	Mr. J. le Gall,
Holland:	Mr. P. M. van Riel,
	Dr. J. J. Tesch,
Norway:	Mr. Paul Bjerkan,
Scotland:	Dr. A. Bowman,
Sweden:	Dr. K. A. Andersson.

Transition Area Committee.

Denmark:	Dr. A. C. Johansen, chairman,
	Professor Martin Knudsen,
Germany:	Dr. S. Strodtmann,
	Dr. E. Fischer,
Norway:	Mr. Paul Bjerkan,
Sweden:	Professor O. Pettersson,
	Dr. K. A. Andersson.

Baltic Area Committee.

Sweden:	Dr. K. A. Andersson, chairman,
Denmark:	Dr. A. C. Johansen,
	Professor Martin Knudsen,
Finland:	Professor R. Witting,
	Professor T. H. Järvi,
Germany:	Professor H. Henking,
	Dr. E. Fischer,
Latvia:	Mr. V. Miezis,
Poland:	Professor M. Siedlecki,
	Mr. J. Borowik.

Hydrographic Committee.

Denmark:	Professor Martin Knudsen, chairman,
Belgium:	Professor G. Gilson,
England:	Dr. J. N. Carruthers,
	Mr. J. R. Lumby,
Finland:	Professor R. Witting,
France:	Dr. Ed. le Danois,
	Mr. J. le Gall,

Germany:	Professor G. Schott,
Holland:	Mr. P. M. van Riel,
	Professor E. van Everdingen,
Irish Free State:	Mr. G. P. Farran,
Italy:	Professor G. Magrini,
Latvia:	Mr. V. Miezis,
Norway:	Mr. Oscar Sund,
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Portugal:	Dr. A. Ramalho,
Scotland:	Professor D'Arcy W. Thompson,
Spain:	Mr. Léon Herrero,
	Professor José Giral,
	failing them Professor Rafael de Buen,
Sweden:	Professor O. Pettersson.

Plankton Committee.

Denmark:	Professor C. H. Ostenfeld, chairman,
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Gr. Britain:	Mr. R. E. Savage,
Germany:	Professor K. Brandt,
Holland:	Dr. J. J. Tesch,
Irish Free State:	Mr. G. P. Farran,
Latvia:	Mr. V. Miezis,
Norway:	Mr. Paul Bjerkan,
	Professor H. H. Gran,
Poland:	Dr. A. Litynski,
Scotland:	Dr. R. S. Clark,
Spain:	Dr. Juan Cuesta Urcelay,
Sweden:	Dr. K. A. Andersson.

Statistical Committee.

Scotland:	Professor D'Arcy W. Thompson, chairman,
	Mr. David T. Jones,
Belgium:	Professor G. Gilson,
England:	Dr. E. S. Russell,
	Mr. T. Edser,
Finland:	Professor T. H. Järvi,
France:	Mr. G. Lecourbe,
Germany:	Dr. E. Fischer,
Holland:	Dr. J. J. Tesch,
Irish Free State:	Mr. C. Green,
Latvia:	Mr. V. Miezis,

Norway:	Mr. S. K. Asserson,
Poland:	Mr. J. Borowik,
Spain:	Mr. le Com. José Maria Roldán,
	Dr. Fernando de Buen,
Sweden:	Dr. K. A. Andersson.

Limnological Committee.

Germany:	Professor H. Henking, chairman,
	Professor E. Ehrenbaum.
Denmark:	Dr. A. C. Johansen,
England:	Dr. E. S. Russell,
Finland:	Professor T. H. Järvi,
France:	Professor L. Roule,
Irish Free State:	Mr. R. Southern,
Latvia:	Mr. V. Miezis,
Poland:	Professor M. Siedlecki,
	Dr. F. E. Lubecki,
Spain:	Dr. Fernando de Buen,
Sweden:	Dr. K. A. Andersson.

Editorial Committee.

Professor O. Pettersson, chairman,
Professor D'Arcy W. Thompson,
Professor G. Gilson,
Professor L. Joubin,
failing him Dr. Ed. le Danois,
Professor Martin Knudsen,
Professor E. Ehrenbaum,
Professor Odón de Buen,
Professor G. Magrini,
Professor M. Siedlecki,
Dr. E. S. Russell.

Finance Committee.

The President,
Professor M. Knudsen,
Professor Johs. Schmidt,
Mr. H. E. Bradley,
Mr. G. Lecourbe,
Mr. S. K. Asserson.

Special Committees.

Whaling Committee.

Professor JOHAN HJORT, chairman,
Mr. J. O. BORLEY,
Dr. FERNANDO DE BUEN,
Dr. ED. LE DANOIS,
Mr. DAVID T. JONES,
Deputy Dr. A. BOWMAN,
Professor JOHS. SCHMIDT,
Dr. A. RAMALHO,
Mr. H. LÜBBERT.

Saving Gears Committee.

Prof. O. PETTERSSON, chairman,
Dr. K. A. ANDERSSON,
Dr. A. C. JOHANSEN,
Prof. W. MIELCK,
Mr. J. BOROVIK,
Prof. O. DE BUEN,
Dr. J. J. TESCH,
Dr. A. BOWMAN,
Dr. E. S. RUSSELL.

Recommendations of the Consultative Committee.

Chairman: Professor Johan Hjort.
The Committee met on April 8th, 10th and 13th, 1929.

1. Scientific Meetings.

The Committee decided in regard to the next Scientific Meetings:—

A. Biological Meeting.

1) That the papers read in abstract at this meeting be printed, circulated and taken as the subjects for discussion next year.
2) That in order to focus the discussion on the various definite general aspects of the subject, a list of Agenda be prepared by the Chairman of the Biological Meetings and circulated with the papers, each item of the Agenda to indicate one aspect of the problems treated.
3) That the Chairman may nominate a Reporter or Reporters for different aspects of the subject, who, if appointed shall prepare a Report or Reports indicating the main results brought out by the papers, as a guide for the discussion.

B. Hydrographic Meeting.

1) That the addresses and papers given at this meeting be discussed at next meeting, the papers and Agenda being printed and circulated as in the case of the Biological Meeting.
2) But that in addition the phenomena of the mixing of water masses be discussed.
3) That the Chairman may nominate a Reporter or Reporters for different aspects of the subject, who, if appointed shall prepare a Report or Reports indicating the main results brought out by the papers, as a guide for the discussion.

2. Reports of Committees.

The following reports of Committees were presented by the Chairmen of the Committees concerned and were passed by the Consultative Committee:—

North Eastern Area Committee.	North Western Area Committee.
Atlantic Slope Committee.	Combined North Sea Committee.[1])
Northern North Sea Committee.	Southern North Sea Committee.
Transition Area Committee.	Baltic Committee.
Combined Baltic and Transition Committees.	
Hydrographic Committee.	Plankton Committee.
Statistical Committee.	Limnological Committee.
Whaling Committee.	Sub-Committee for Savings Gear.

[1]) Except Recommendation 3), (p. 40).

Recommandations du Comité Consultatif.

Président: Le Professeur Johan Hjort.
Le Comité se réunit le 8, le 10 et le 13 Avril 1929.

1. Réunions scientifiques.

Le Comité prend les décisions suivantes au sujet des Réunions Scientifiques ultérieures:—

A. Réunion biologique.

1) Les communications dont les résumés sont lues à cette réunion, seront imprimées, distribuées et prises comme sujets de discussion l'année suivante.
2) En vue de concentrer la discussion sur divers points de vue généraux du sujet, une liste d'agenda sera préparée par le Président des Réunions biologiques et distribuée avec les communications, chaque poste de l'Agenda portant l'indication d'un seul point de vue des problèmes abordés.
3) Le Président peut nommer pour les divers points de vue du sujet, un ou plusieurs rapporteurs qui s'ils sont nommés prépareront un ou plusieurs rapports indiquant, pour guider la discussion, les principaux résultats fournis par les communications.

B. Réunion hydrographique.

1) Les adresses et travaux présentés à cette réunion seront discutés à la séance suivante, les communications et l'Agenda étant imprimés et distribués comme pour la Réunion biologique.
2) Toutefois, on entamera outre cela, une discussion sur les phénomènes du mélange des eaux.
3) Le Président peut nommer pour divers points de vue du sujet un ou plusieurs rapporteurs qui s'ils sont nommés prépareront un ou plusieurs rapports indiquant, pour guider la discussion, les principaux résultats fournis par les communications.

2. Rapports des Comités.

Les rapports suivants des Comités ont été présentés par les Présidents des Comités respectifs et sont admis par le Comité consultatif:—

Comité du Secteur Nord-Est.
Comité du Plateau Continental Atlantique.
Comité du Nord de la Mer du Nord.
Comité du Secteur de Transition.
Comité combiné de la Baltique et du Secteur de Transition.
Comité hydrographique.
Comité statistique.
Comité de la Baleine.
Comité du Secteur Nord-Ouest.
Comité combiné de la Mer du Nord.[1])
Comité du Sud de la Mer du Nord.
Comité Baltique.
Comité du Plancton.
Comité limnologique.
Sous-Comité des Engins Épargneurs.

[1]) Excepté Recommandation 3), (p. 41).

The Consultative Committee agreed the following proposals which involve expenditure:—

Atlantic Slope Committee, II, 13.
Combined North Sea Committee, II, 1.
Baltic Committee, II.
Hydrographic Committee, 2.
Plankton Committee, II, 1 and 2.
Limnological Committee, II, 1.
Sub-Committee for Savings Gear, II.

Le Comité consultatif agrée les propositions suivantes qui comportent des dépenses:

Comité du Plateau Continental Atlantique, II, 13.
Comité combiné de la Mer du Nord, II, 1.
Comité Baltique, II.
Comité hydrographique, 2.
Comité du Plancton, II, 1 et 2.
Comité limnologique, II, 1.
Sous-Comité des Engins Épargneurs, II.

Programmes and Reports of Area Committees.

North Eastern Area Committee.

Chairman: Professor Johan Hjort.
Vice-Chairman: Mr. Oscar Sund.
The Committee met at 11.30 a.m. on April 9th, 1929.

Proceedings.

1) The Vice-Chairman, Mr. Oscar Sund, gave a general account of the work done by the different countries.

The Chairman expressed the thanks of the Committee for the contributions to the work furnished by countries other than Norway.

2) Mr. Sund made a communication concerning the cod fishing of this winter. He said that it had been unusually rich in the northern districts, affording a record catch in Lofoten, while even East Finmark got its share of the spawning shoals; this was a quite unusual occurrence, spawning being generally restricted to the waters west and south of the North Cape. The stock fished this year consisted almost exclusively of the 1919 brood, older fish (1917 brood) appearing only from the beginning of March.

3) Mr. Lea communicated some results of his investigations upon the herring, emphasizing the appearance among the West Coast spring-spawning herring shoals of fish of foreign origin.

Another interesting phenomenon of the year 1928 had been the very rich catch of young herrings in the Tromsoe and adjacent areas of North Norway in the autumn and winter, more than three milliards of individuals having been taken, the larger proportion being of the 1925 brood. The influence, if any, of this great influx on the future fishery for mature herrings is a matter of interest.

4) Mr. Bjerkan gave an abstract of recent work on the sprat on the West coast of Norway, comparing the drift of the young sprat and the resulting sprat stock in the different sprat districts. He referred especially to the hydrographical and biological conditions in the Western sprat district during the preceding fishing season.

5) Dr. Bowman stated that work on the haddock of the Barents Sea would commence in Scotland shortly.

6) Prof. Mielck said that work on Barents Sea fish is now being carried out in Germany, an assistant being placed at Geestemünde in order to make measurements of fish landed at that port.

Programmes et Rapports des Comités des Secteurs.

Comité du Secteur Nord-Est.

Président: le Professeur Johan Hjort.
Vice-Président: Mr. Oscar Sund.
Le Comité se réunit le 9 Avril 1929 à 11h30 a.m.

Compte rendu.

1) Le Vice-Président M. Oscar Sund fait un rapport général sur le travail accompli dans les divers pays.

Le Président exprime les remerciements du Comité pour les contributions au travail fournies par les Pays autres que la Norvège.

2) M. Sund fait une communication sur la pêche du cabillaud pendant cet hiver. Il dit que cette pêche a été d'une richesse inusitée dans les districts septentrionaux. Elle a fourni un record de capture aux Lofoten, alors que le Finmark oriental lui même recevait sa part des bancs de reproduction. Ceci est un évènement tout à fait inusité car la ponte se restreint généralement aux eaux de l'Ouest et du Sud du Cap Nord. Le stock pêché cette année consistait presque exclusivement en individus de la génération de 1919, les poissons plus âgés (génération de 1917) n'ayant apparu que depuis le commencement de mars.

3) M. Lea présente quelques résultats de ses investigations sur le hareng; il insiste sur l'apparition de poissons d'origine étrangère parmi les bancs de harengs à ponte printanière de la côte occidentale.

Un autre phénomène intéressant de l'année 1928 a été la riche capture de jeunes harengs, en automne et en hiver, dans la région de Tromsoe et autres régions voisines, de la Norvège septentrionale. Plus de trois milliards d'individus ont été pêchés; ils appartenaient surtout à la génération de 1925. L'influence possible de cette grande invasion, sur la pêche future des harengs matures est une question intéressante.

4) M. Bjerkan présente un résumé de son récent travail sur l'esprot à la côte Ouest de Norvège, dans lequel il compare les passages d'esprots jeunes avec les stocks d'esprot qui en résultèrent dans les différents districts. Il y traite spécialement les conditions hydrographiques et biologiques dans le district occidental de la pêche de l'esprot pendant la saison précédente.

5) Le Dr. Bowman annonce que le travail sur l'églefin de la Mer de Barents commencera bientôt en Ecosse.

6) Le Professeur Mielck dit que le travail sur le poisson de la Mer de Barents se fait déjà en ce moment en Allemagne. Un assistant a été placé à Geestemünde pour y faire des mensurations de poissons débarqués dans ce port.

7) Prof. GRAN reported on his investigations at Møre on the plankton and nitrates. The growth of microplankton began in the fjords and at the edge of the continental shelf, although a certain amount of nitrates were found all over the area investigated. Two or three weeks later a rich growth was found over the whole area.

8) Prof. OTTO PETTERSSON urged the desirability of taking an oceanographical section across the Norwegian Channel off Egersund in November. In that case Sweden would make sections more to the east.

In reply to a question from the Chair, Mr. ASSERSON said that it might be possible to make this section before the "Johan Hjort" is sent out on a late autumn cruise between Bergen and West Finmark.

9) The Chairman and Vice-Chairman were re-elected.

North Western Area Committee.

Chairman: Mr. DAVID T. JONES.
The Committee met at 2.30 p.m. on April 10th, 1929.

Proceedings.

As arranged at last year's meeting Mr. JONES took the chair in the unavoidable absence of Professor SCHMIDT on the world expedition in the "Dana".

1) The Administrative Report prepared by Professor SCHMIDT was read and charts illustrating the results were exhibited. These referred to:—
   a) Preliminary analysis of the material collected for the investigation of the fluctuations in the cod fishery in Icelandic waters.
   b) The marking of cod on the Eastern and Western coasts of Greenland, and on the West Greenland banks by the Inspection Vessel "Godthaab".
   c) The migration of the herring in its relation to its food.
   d) The course of the currents around Iceland.
   e) Continuous hydrographical investigations in Faxa Bay and at the Faroes.
   f) The collection of material for investigating the stock of cod in Faroe waters.

2) It was reported that Denmark, Norway and Scotland were the only countries which had carried out investigations in the area in 1928, but that Norway had planned to make an expedition in a private sealer to the ice region in Denmark Strait in the months of May to August 1929. This expedition will investigate especially the hydrographic and biochemical conditions for plankton growth (nitrates, phosphates and ammonia) and the distribution of the plankton, particularly among the ice floes.

3) Scotland proposes to continue investigations especially on the haddock material available.

4) The following publications have been issued or are in preparation:—

7) Le Professeur Gran fait rapport sur les investigations qu'il a conduites à Moere sur le plancton et sur les nitrates. Le développement du microplancton commença dans les fjords et sur le bord du plateau continental, bien qu'une certaine quantité de nitrates aient été trouvée dans toute la région explorée. Deux ou trois semaines plus tard un développement riche se manifesta dans l'aire totale.
8) Le Professeur Otto Pettersson insiste sur la désirabilité de l'exécution d'une section océanographique en Novembre dans le Canal de Norvège par le travers d'Egersund. Si cela se fait, la Suède exécutera des sections plus à l'Est.

En réponse à une question du Président M. Asserson dit qu'il sera peut-être possible de faire cette section avant que le "Johan Hjort" soit envoyé en croisière à la fin de l'automne entre Bergen et le Finmark occidental.

9) Le Président et le Vice-Président sont réélus.

Comité du Secteur Nord-Ouest.

Président: Mr. David T. Jones.
Le Comité se réunit le 10 Avril 1929 à 2h30 p.m.

Compte rendu.

Ainsi qu'il a été convenu à la réunion de l'an dernier, M. Jones prend la présidence en l'absence du Professeur Schmidt qui fait, sur le "Dana" une expédition autour du monde.

1) Le rapport administratif dressé par le Professeur Schmidt est lu et des cartes montrant les résultats sont exhibées. Ce rapport comprend les points suivants:—
   a) Analyse préliminaire du matériel recueilli par la recherche sur la fluctuation de la pêche du cabillaud dans les eaux d'Islande.
   b) Marquage de cabillaud sur les côtes Est et Ouest du Groenland et sur les bancs du Groenland Occidental, par le navire d'inspection "Godthaab".
   c) Migration du hareng dans ses rapports avec sa nourriture.
   d) Courants autour de l'Islande.
   e) Investigations hydrographiques continues dans la baie de Faxa et aux Faroe.
   f) Réunion de matériel pour l'étude du stock de cabillaud dans les eaux des Faroe.
2) Il est rapporté que le Danemark, la Norvège et l'Ecosse sont les seuls Pays qui aient conduit des investigations dans le secteur Nord-Ouest en 1928. Toutefois, la Norvège projette de faire avec un phoquier privé une expédition dans la région des glaces du Détroit de Danemark pendant les mois de mai—août 1929. Cette expédition étudiera spécialement les conditions hydrographiques et biochimiques en rapport avec le développement du plancton (nitrates, phosphates et ammoniaque) et la distribution du plancton, particulièrement parmi les floes.
3) L'Ecosse se propose de poursuivre des recherches spécialement sur le matériel concernant l'églefin qui sera obtenu.
4) Les publications suivantes ont été faites ou sont en préparation:—

Rapp. et Proc.-Verb. Vol. LVII

HAROLD THOMPSON: General Features in the Biology of the Haddock (*Gadus aeglefinus* L.) in the Icelandic Waters in the period 1903—1926.

R. SPÄRCK: Preliminary Survey of the results of the Quantitative Bottom Investigations at Iceland and the Faroes in 1926—1927.

ARNI FRIDRIKSSON: Age-Composition of the Stock of Cod in the East-Icelandic Fjords during the years 1925—1927.

Å. V. TÅNING: Plaice Investigations in Icelandic Waters.

Medd. Komm. Havunders. Ser. Fiskeri, VII, 7

BJ. SAEMUNDSSON: On the Age and the Growth of the Coalfish (*Gadus virens* L.), the Norway Pout (*Gadus esmarki* Nilsson) and the Poutassou (*Gadus poutassou* Risso) in Icelandic Water.

In Preparation: A Survey of the Results of Marking of 1,200 Cod at the Faroes in 1923.

5) Professor SCHMIDT was re-elected as Chairman for the ensuing year.

Atlantic Slope Committee.

Chairman: Dr. ED. LE DANOIS.
Vice-Chairman: Prof. RAFAEL DE BUEN.
The Committee met at 10 a.m. on April 10th, 1929.

I. Proceedings.

1) The Chairman welcomed Prof. BRUNO SCHULZ who was present instead of Dr. SCHOTT as Germany's representative at the Committee.
2) The first number of the illustrations of the Atlantic Fauna published under the direction of Prof. JOUBIN was presented to the Committee, as was the "Rapport Atlantique" for 1927.
3) The question of the penetration of Mediterranean waters into the Atlantic through the Straits of Gibraltar was thoroughly discussed by the members.
4) Prof. ROULE submitted to the Committee his report on the study of the actual conditions of the migratory ascent of the Atlantic salmon (*Salmo salar* L.) in the water ways of France. This memoir will be printed in the next "Rapport Atlantique".
5) Dr. FERNANDO DE BUEN presented to the Committee a study on the alternation of the sardine and the sprat fisheries. This paper will be printed in the next "Rapport Atlantique".
6) Messrs. LE DANOIS and RAFAEL DE BUEN were re-elected Chairman and Vice-Chairman.

II. Recommendations.

1) With a view to continuing the study of hydrographical and biological conditions in the Bay of Biscay periodical quarterly cruises will be made by the Governments of France, Spain and the Irish Free State, the cruises being as follows:—

Rapp. et Proc.-Verb. Vol. LVII

Harold Thompson: Les traits caractéristiques généraux de la biologie de l'églefin (*Gadus aeglefinus* L.) dans les eaux d'Islande pendant la période 1903—1926.

R. Spärck: Résumé préliminaire sur les résultats des investigations quantitatives du fond autour de l'Islande et des Faroes en 1926—1927.

Arni Fridriksson: Composition d'âge du stock du cabillaud dans les fjords de l'Islande orientale pendant les années 1925—1927.

Å. V. Tåning: Investigations sur la plie dans les eaux d'Islande.

Medd. Komm. Havunders. Ser. Fiskeri, VII, 7

Bj. Saemundsson: Sur l'âge et la croissance du merlan noir (*Gadus virens* L.), du merlan norvégien (*Gadus esmarki* Nilsson) et du merlan poutassou (*Gadus poutassou*, Risso) dans les eaux islandaises.

En préparation: Une revue des résultats du marquage de 1200 cabillauds aux Faroes en 1923.

5) Le Professeur Schmidt est réélu Président pour l'année suivante.

Comité du Plateau Continental Atlantique.

Président: Dr. le Danois.
Vice-Président: Professeur R. de Buen.
Le Comité se réunit le 10 Avril 1929 à 10h a.m.

I. Compte rendu.

1) Le Président souhaite la bienvenue au Dr. Bruno Schulz qui remplace le Dr. Schott, comme représentant de l'Allemagne au Comité.
2) Le premier cahier de fiches faunistiques éditées sous la direction de M. le Professeur Joubin est présenté au Comité, ainsi que le Rapport Atlantique pour 1927.
3) La question de la pénétration des eaux de la Méditerranée dans l'Atlantique à travers le détroit de Gibraltar est discutée d'une façon approfondie en séance.
4) M. le Professeur Roule remet au Comité son rapport sur l'Etude sur les conditions actuelles de la montée migratrice du saumon atlantique (*Salmo salar* L.) dans les cours d'eau de France. Ce mémoire sera imprimé dans le prochain Rapport Atlantique.
5) M. le Dr. Fernando de Buen présente au Comité une étude sur les alternances de la pêche de la sardine et du sprat. Ce travail sera imprimé dans le prochain Rapport Atlantique.
6) MM. le Danois et Rafael de Buen sont réélus Président et Vice-Président

II. Recommandations.

1) En vue de continuer l'étude des conditions hydrographiques et biologiques du Golfe de Gascogne, des croisières périodiques trimestrielles seront effectuées par les gouvernements de la France, de l'Espagne et de l'Etat Libre d'Irlande, dans les conditions suivantes:

Spain: 8° W. from the coast to 47° N.
6° W. from the coast to 44°30′ N.
Along the 43° N. from the coast to 10° W.
France: From Ushant to 9° W. (49° N.).
9° W. from 49° N. to 47° N.
From 47° N. (9° W.) to Ushant.
Ireland: 8° W. from the coast to 49° N.
49° N. between 8° and 9° W.
9° W. from 49° N. to the coast of Ireland.

These cruises will be undertaken during the months of February, May, August and November.

During each cruise deep sea observations will be made at one or more stations off the Atlantic Slope; if possible from the surface to the bottom. The cruises will be utilized for plankton observations.

2) The study of the western Channel will be undertaken by the British Government, in the form of periodical cruises by the vessel of the Marine Biological Association.

3) The Irish Free State will undertake cruises to the southwest of Ireland with a view to determining the position of the 35.5 $^{0}/_{00}$ isohaline.

4) The investigations of the Committee in the region of the Canaries are to be entrusted to the new Spanish Laboratory in these islands.

5) The investigations in the Bay of Spain will be undertaken by Portugal and Spain, the following sections to be worked in February and August:—

Portugal { a) Cape St. Vincent — Casablanca.
b) Guadiana — Larache.

Spain { c) Cadiz — Arzilah.
d) Cape Trafalgar — Cape Spartel.
e) Tarifa — Tanger.

6) The investigations in the Straits of Gibraltar will be made in accordance with those of the Mediterranean Commission.

7a) The investigations on common tunny and long finned tunny will be continued in their present form.

b) The investigations on sardine will especially bear on the differentiation of local races and the time and place of spawning, based not only on the sexual condition of the fishes, but also on the plankton collections of eggs and larvae.

c) The investigations on the hake will be continued in their present form; moreover a cruise of the "George Bligh" will be arranged in August. This cruise will allow of observations on the size of the meshes in the trawls.

8) The investigation on the races of herring will be continued in the western Channel and in the waters to the south-west of the British Isles.

9a) The method of biological statistics will in a very high degree be applied to all questions studied by the Committee.

Espagne: 8° W. G. de la côte jusqu'au 47° N.
6° W. G. de la côte jusqu'au 44°30′ N.
le long du 43° N. de la côte jusqu'au 10° W. G.
France: d'Ouessant au 9° W. G. (49° N.)
9° W. G. du 49° N. au 47° N.
du 47° N. (9° W.) à Ouessant.
Irlande: 8° W. G. de la côte au 49° N.
49° N. entre 8° et 9° W. G.
9° W. G. du 49° N. à la côte d'Irlande.

Ces croisières seront effectuées aux mois de février, mai, août et novembre.

A chaque sortie, une ou plusieurs stations comprendront des observations en eau profonde; si possible de la surface au fond, en dehors du Plateau continental. Les sorties seront utilisées pour des pêches planctoniques.

2) L'Etude de la Manche Occidentale sera faite par les soins du Gouvernement de Grande-Bretagne sous forme de croisières périodiques, exécutées par le navire de la "Marine Biological Association".

3) L'Etat Libre d'Irlande exécutera des croisières au Sud-Ouest de cette île afin de préciser la position de la ligne isohaline 35,5 $^{0}/_{00}$.

4) Les études du Comité dans la région des Canaries seront confiées au nouveau laboratoire espagnol de ces îles.

5) Les études dans la Baie d'Espagne seront effectuées par le Portugal et l'Espagne, qui effectueront au mois de février et au mois d'août les coupes suivantes:—

Portugal { a) Cap St. Vincent — Casablanca.
b) Guadiana — Larache.

Espagne { c) Cadiz — Arzilah.
d) Cap Trafalgar — Cap Spartel.
e) Tarifa — Tanger.

6) Les recherches dans le détroit de Gibraltar seront effectuées en accord avec celles de la Commission de la Méditerranée.

7a) Les études sur le thon rouge, et le germon seront continuées sous leur forme actuelle.

b) Les études sur la sardine porteront principalement sur la différenciation des races locales et les dates et lieux de ponte, en se basant non seulement sur l'état sexuel des poissons, mais aussi sur les récoltes planctoniques d'œufs et de larves.

c) Les études sur le merlu seront continuées sous leur forme actuelle; de plus il est prévu une croisière du navire "George Bligh" au mois d'août. Cette croisière permettra des observations sur la dimension des mailles des chaluts.

8) L'étude des races de hareng sera continuée en Manche Occidentale et dans la région Sud-Ouest des îles Britanniques.

9a) La méthode des statistiques biologiques sera appliquée dans une très large mesure à toute question étudiée par le Comité.

b) It is desirable that the hydrological observations be accompanied by biological observations, since certain species are characteristic of ranges of depth or of definite physico-chemical conditions.

10) Plankton studies will be undertaken during the various cruises in order to collect information on the plankton which forms the food of whales.

11) A service of rapid information will be organised among the members of the Committee after each cruise. Provisional lists of temperatures and final lists of salinities will be despatched by each member of the Committee to his colleagues as soon as he has received the communications in question.

12) The report presented by Prof. Odón de Buen on a service of regular observations from the coastal laboratories will be communicated to the members of the Committee who are requested to inform the Chairman of their observations on this subject.

13) The illustrations of the Atlantic Fauna will be continued to be published by the International Council under the direction of Prof. Joubin under the present con ditions.

Combined North Sea Committee.

Chairman: Mr. David T. Jones.
Vice-Chairman: Professor Gilson.
The Committee met at 11.30 a.m. on April 11th, 1929.

I. Proceedings.

1) The Administrative Report was submitted referring to the continued co-operation of both North Sea Committees and to the communication to Scotland of data bearing on haddock investigations and collected by Denmark, Holland and Norway.

2) A communication was received from the Hydrographic Committee with regard to the prompt dissemination of information bearing on the hydrography of the North Sea. (See Recommendation No. 1.)

3) Professor Hardy, Hull University, described a new method which he had devised for the continuous collection of plankton.

The Committee decided to recommend that the fishing industry should be invited to support the investigations initiated by Professor Hardy, so that he might be able to continue his experiments.

4) A report from the Sub-Committee of the Consultative Committee for Savings Gear was communicated. (See Recommendation No. 2).

5) The Committee approved the recommendation of the Southern North Sea Committee concerning the next Scientific Meeting of the Council. (See Recommendation No. 3).

6) Mr. David T. Jones and Professor Gilson were re-elected as Chairman and Vice-Chairman of the Committee.

b) Il est désirable que les observations hydrologiques soient accompagnées d'observations biologiques étant donné que certaines espèces sont caractéristiques de niveaux déterminés ou de conditions physicochimiques précises.

10) Des études planctoniques seront effectuées au cours des diverses sorties en vue de recueillir des renseignements sur le plancton servant de nourriture aux cétacés.

11) Il sera organisé un service d'information rapide entre les membres du Comité après chaque sortie des navires. Des listes provisoires avec les températures, et définitives avec les salinités seront adressées par chaque membre du Comité à ses collègues aussitôt que les renseignements en question seront en sa possession.

12) Le rapport présenté par le Professeur Odón de Buen, sur un service d'observations regulières faites à partir des laboratoires côtiers, sera communiqué aux membres du Comité qui devront faire parvenir au Président leurs observations à ce sujet.

13) Les fiches faunistiques continueront à être éditées par le Conseil International sous la direction de M. le Professeur Joubin, dans les conditions actuelles.

Comité Combiné de la Mer du Nord.

Président: Mr. David T. Jones.
Vice-Président: le Professeur Gilson.
Le Comité se réunit le 11 Avril 1929 à 11h30 a.m.

I. Compte rendu.

1) Le rapport administratif est déposé. Il a trait à la continuation de la coopération des deux Comités de la Mer du Nord et à la communication à faire à l'Ecosse des données concernant les recherches sur l'églefin recueillies par le Danemark, la Hollande et la Norvège.

2) Une communication est reçue du Comité hydrographique: elle concerne la prompte distribution des informations concernant l'hydrographie de la Mer du Nord (Voir la recommandation No. 1).

3) Le Professeur Hardy, de l'Université de Hull, décrit une nouvelle méthode de prélèvement continu du plancton, qu'il a inventée.

Le Comité décide de recommander que l'industrie de la pêche soit invitée à soutenir les investigations commencées par le Professeur Hardy, afin de le mettre à même de continuer ses expériences.

4) Un rapport du Sous-Comité des Engins épargneurs (du Comité Consultatif) est déposé. (Voir la recommandation No. 2.)

5) Le Comité approuve la recommandation du Comité du Sud de la Mer du Nord concernant la prochaine Réunion scientifique du Conseil. (Voir la recommandation No. 3).

6) M. David T. Jones et le Professeur Gilson sont réélus respectivement Président et Vice-Président du Comité.

II. Recommendations.

1) It was recommended that particulars of hydrographic data for the North Sea should be sent on request in the form of proof prints of the Bulletin instead of being shown on charts prepared for the purpose.
2) The Committee was of the opinion that a prompt publication of the reports received by the Sub-Committee for Savings Gear was desirable.
3) The Committee recommended that the following subjects be discussed at the next Scientific Meeting of the Council:—
   a) On the correlation of hydrographic results with biological observations in recent years, or
   b) On the value of quantitative investigations of bottom invertebrates for fishery research.

Northern North Sea Committee.

Chairman: Dr. A. Bowman.
The Committee met at 10 a.m. on April 10th, 1929.

Proceedings.

1) Mr. Davis was welcomed as a Member.
2) The Administrative Report was approved.
3) Communications were read by:—
   a) Dr. R. S. Clark: "Larval and Post-larval Herring".
   b) Prof. E. Ehrenbaum: "The Completion of the North Sea Stock of Fish from waters outside the North Sea, with special reference to the Gadidae and other food Fishes."
   c) Dr. Molander: "Notes on the Biology of the Witch in the waters of the North Sea."
   d) Dr. Bowman: "The Lemon Sole: Scales, Age Determination and some Remarks on Marking Experiments on the East Coast of Scotland."

Owing to the limitations of time discussion of these subjects was confined to a few major points:—

a) Professor Mielck suggested as a continuation of the study of the early stages of the herring that attempts should be made to determine the intensity of spawning on the different grounds. On the Chairman's suggestion discussion of this subject was deferred until the Meeting of the Combined North Sea Committee.

In connexion with Dr. Clark's suggestion of the ultimate mixing of herring from Scottish and Norwegian spawning grounds, Mr. Hodgson stated that his results suggest the mixing of herrings derived from the Yorkshire Coast and the Channel Spawning grounds.

In reference to the same question, Mr. Lea suggested that as regards racial investigations Norwegian collaboration might be arranged, with special reference to

II. Recommandations.

1) Il est recommandé que le détail des données hydrographiques pour la Mer du Nord soit envoyé, sur demande, sous la forme d'épreuves du Bulletin au lieu d'être pointé sur des cartes préparées à cet effet.
2) Le Comité est d'avis qu'une prompte publication des rapports soumis au Sous-Comité des Engins épargneurs est à désirer.
3) Le Comité recommande que les sujets suivants soient discutés à la prochaine Réunion scientifique du Conseil:
   a) La corrélation entre les résultats hydrographiques et les observations biologiques des années récentes, ou
   b) La valeur pour les recherches de pêcherie de l'investigation quantitative des invertébrés du fond.

Comité du Nord de la Mer du Nord.

Président: le Dr. A. Bowman.
Le Comité se réunit le 10 Avril 1929 à 10h a.m.

Compte rendu.

1) M. Davis est reçu comme membre.
2) Le rapport administratif est approuvé.
3) Des communications sont présentées par:
   a) Le Dr. R. S. Clark: "Le hareng larvaire et postlarvaire".
   b) Le Professeur Ehrenbaum: "Le complément du stock des poissons de la Mer du Nord aux dépens des eaux extérieures à la Mer du Nord, avec référence spéciale aux Gadidae et à d'autres poissons alimentaires".
   c) Le Dr. Molander: "Notes sur la biologie de la plie cynoglosse dans les eaux de la Mer du Nord".
   d) Le Dr. Bowman: "La Sole-limande: Ecailles, détermination de l'âge, et quelques remarques sur des expériences de marquage faites à la côte orientale de l'Ecosse".

Par suite de la limite du temps, la discussion sur ces sujets est restreinte à quelques points d'importance majeure:

a) Le Prof. Mielck propose qu'en continuation de l'étude des stades jeunes du hareng on s'efforce de déterminer l'intensité de la ponte sur les divers fonds. A la suggestion du Président, la discussion sur ce sujet est différée jusqu'à la réunion du Comité combiné de la Mer du Nord.

A propos de la suggestion du Dr. Clark au sujet du mélange ultime des harengs venus des champs de ponte d'Ecosse et de Norvège, M. Hodgson déclare que ses résultats indiquent un mélange des harengs originaires des champs de ponte de la côte du Yorkshire et de la Manche.

Au sujet de la même question, M. Lea suggère que pour l'investigation des races la collaboration de la Norvège pourrait être organisée, spécialement pour

the herring originating from the chief spawning grounds off the South-west Norwegian coast, e.g. the Naze, Karmsund, Karmoe.

b) In reference to the recruitment of the stock of North Sea fishes from outside waters, the Chairman suggested that one of the chief uses of the study of this subject was that of providing ready pointers on variations in the incursions of Atlantic water. In the case of the haddock, it was stated by Dr. H. Thompson that if the North Sea area be taken as naturally including the waters to the northwest of Scotland no incursion from outside waters occurs, though possibly occasional loss to Norwegian waters of the fry may take place.

c) and d) Prof. Ehrenbaum suggested that it is desirable to secure further knowledge of the witch and sole in the egg and larval stages.

4) The following points relating to future work were referred to the Combined North Sea Committee for consideration:—
   a) Co-ordination of the Methods of Investigation of Herring Larvae (Types of nets, etc.).
   b) The remit from the Hydrographic Committee on the subject of Normal Salinity Charts for the North Sea.
5) It was decided to recommend to the Consultative Committee the following as suitable subjects for the Scientific Meeting:—
   a) The relation of the constitution of the Benthos to the growth of fish.
   b) The correlation of Hydrographic and Biological Studies.
   c) Migration of Fish.
6) A discussion took place as to the importance of making the results of the investigations available for the information of the fishing industry, especially in the case of such researches as those touching on the fluctuation of the stock of fish and the prediction of good and bad years. The Committee considered that every possible opportunity should be taken of stating these results in simple language, both by printed publications and in personal conversations with members of the industry. In order to render publication possible in time to be of service, it will be necessary to send in the relevant data to the centres where collation takes place more promptly than in the past.
7) Dr. A. Bowman was re-elected Chairman for the ensuing year.

Southern North Sea Committee.

Chairman: Professor Mielck.

The Committee met at 10 a.m. on April 10th, 1929.

I. Proceedings.

1) The Administrative Report was adopted.
2) Arrangements were discussed for reaching a higher degree of uniformity in the quantitative methods adopted in biological investigations and in the duration of the

les harengs originaires des principaux champs de ponte du large de la côte Sud-Ouest de Norvège, c'est-a-dire, du Naze, de Karmsund et de Karmoe.

b) A propos du recrutement du stock des poissons de la Mer du Nord aux dépens des eaux extérieures, le Président suggère que l'une des principales utilités de l'étude de ce sujet est de fournir des indications suivies sur la variation des incursions provenant des eaux atlantiques. Dans le cas de l'églefin, le Dr. H. Thompson déclare que si l'on considère le secteur de la Mer du Nord comme comprenant les eaux du Nord-Ouest de l'Ecosse, il ne se produit aucune incursion des eaux extérieures, bien qu'il puisse y avoir des pertes occasionnelles du jeune poisson, vers les eaux norvégiennes.

c) et d) Le Professeur Ehrenbaum fait remarquer qu'il serait à désirer que l'on pousse plus loin l'étude de la plie cynoglosse (Witch) et de la sole aux stades d'œufs et de larves.

4) Les points suivants, relatifs au travail futur sont signalés à l'attention du Comité combiné de la Mer du Nord:
   a) La coordination des méthodes de recherches sur les larves de hareng (Types de filets, etc.).
   b) La remise des données du Comité hydrographique concernant les cartes de salinité normale pour la Mer du Nord.
5) Il est décidé de recommander au Comité consultatif les sujets suivants comme s'indiquant pour les Réunions scientifiques:
   a) La relation entre la composition du benthos et la croissance du poisson.
   b) La corrélation entre les études hydrographiques et biologiques.
   c) La migration du poisson.
6) Une discussion s'ouvre au sujet des résultats des investigations: il importe de rendre ces résultats accessibles à l'information pour l'industrie de la pêche, et en particulier dans le cas des recherches touchant à la fluctuation du stock de poisson et à la prévision des bonnes et des mauvaises années. Le Comité pense qu'il faut saisir toutes les occasions possibles de faire connaître ces résultats, en langage simple, tant par des publications qu'en conversation personnelle avec les membres de l'industrie. En vue d'en rendre la publication possible en temps utile, il sera nécessaire d'envoyer plus promptement que dans le passé, les données opportunes aux centres qui procèdent à leur collation.
7) Le Dr. A. Bowman est réélu Président pour l'année suivante.

Comité du Sud de la Mer du Nord.

Président: le Professeur Mielck.
Le Comité se réunit le 10 avril 1929 à 10h a. m.

I. Compte rendu.

1) Le rapport administratif est adopté.
2) On discute des arrangements tendant à l'obtention d'un plus haut degré d'uniformité des méthodes quantitatives d'investigation biologique et de la durée de pêche des

horizontal hauls of the gear employed, with a view to improving the comparability of the results obtained. The conclusions reached are given below (II, 1, 2).

In the course of the discussion Dr. Andersson stated that the depth at which horizontal hauls are being made can be estimated by measuring the angle between the warp and the horizontal by means of a sextant. Dr. Allen informed the Committee that the depth recorder used by Mr. F. S. Russell is now available for scientific research and can be purchased from Messrs. Barr & Stroud, of Glasgow.

3) Professor Gilson reported on the further progress of his work on the Belgian coastal fisheries. He laid before the Committee graphs showing the mean monthly length composition of plaice caught by different gear.
4) Communications were made by Messrs. Bjerkan, Le Gall, Hodgson, Johansen and Tesch on the subject of race determination in herring and sprat.
5) The Committee recorded its opinion that among the investigations carried out by the Committee those upon fluctuations in the stock of fish (which are designed to furnish the basis for the prediction of good and bad fishing seasons) and upon saving gears are of particular practical importance.
6) No change was made in the programme for the ensuing year, but the Chairman will collect the opinion of the Committee as to which work is considered most urgent, and will communicate the results of his enquiry to the members before February 1st, 1930.
7) Professor Mielck was re-elected Chairman.

II. Recommendations.

1) That in the investigation of fish fry, the methods and gear recommended by the Northern North Sea Committee last year (Rapp. & Proc.-Verb., Vol. XLIX, p. 44) should be adopted, and that horizontal hauls, at whatever depth they are taken, should be of the standard duration of 15 minutes.
2) That brief indications of the work it is intended to carry out at sea during the ensuing year should be furnished, as far as possible, by each country. The Chairman will collect these programmes and circulate them before the next meeting of the Committee.
3) As suitable subjects for discussion at the Scientific Meeting of 1930 the Committee recommended:—
   a) The value of quantitative investigations on bottom invertebrates for fishery researches.
   b) The results in recent years bearing on correlation between hydrographic factors and biological phenomena.

engins horizontals employés en vue de rendre plus exactement comparables les résultats obtenus. Les conclusions sont exposées ci-dessous (II, 1, 2).

Au cours de la discussion le Dr. Andersson fait remarquer que la profondeur à laquelle se font les pêches horizontales peut être estimée par la mesure de l'angle compris entre la touée et la ligne horizontale, prise à l'aide d'un sextant. Le Dr. Allen fait connaître au Comité que l'indicateur de profondeur employé par M. F. S. Russell est maintenant adapté aux recherches scientifiques et peut être acheté chez MM. Barr et Stroud à Glasgow.

3) Le Professeur Gilson fait rapport sur le progrès de son travail sur la pêche littorale. Il présente au Comité des graphiques montrant la longueur moyenne mensuelle des plies capturées par divers moyens.
4) Des communications sont faites par MM. Bjerkan, Le Gall, Hodgson, Johansen et Tesch au sujet de la détermination des races du hareng et de l'esprot.
5) Le Comité exprime l'avis que, parmi les investigations entreprises, celles qui portent sur les fluctuations du stock des poissons (tendant à fournir une base à la prévision des bonnes et des mauvaises années de pêche) et sur les engins épargneurs, sont d'une importance pratique particulière.
6) Aucun changement n'est apporté au programme pour l'année suivante, mais le Président prendra l'avis du Comité au sujet du travail qui est considéré comme le plus urgent, et il communiquera aux membres les résultats de son enquête avant le 1° février 1930.
7) Le Professeur Mielck est réélu Président.

II. Recommandations.

1) Que dans les investigations sur le jeune poisson les méthodes et les engins recommandés par le Comité du Nord de la Mer du Nord l'année passée (Rapp. et Proc.-Verb., Vol. XLIX, p. 45) soient adoptés et que les pêches horizontales à toutes profondeurs, soient de la durée "standard" de 15 minutes.
2) Qu'il soit donné autant que possible par chaque Pays, de brèves indications sur le travail qu'on a l'intention de poursuivre au cours de l'année suivante. Le Président recueillera ces programmes et les distribuera avant la prochaine réunion du Comité.
3) Le Comité recommande comme sujets de discussion à la Réunion Scientifique de 1930:
   a) La valeur des investigations quantitatives sur les invertébrés du fond, pour les recherches de pêcherie.
   b) Les résultats des recherches récentes au point de vue de la corrélation existante entre les facteurs hydrographiques et les phénomènes biologiques.

Transition Area Committee.

Chairman: Dr. A. C. Johansen.

The Committee met at 10 a.m. on April 10th, 1929.

I. Proceedings.

1) The Committee received the following communications:—
   a) Dr. Andersson on behalf of Dr. Molander: "Some observations concerning the stock of haddock in the Skagerack and Kattegat."
   b) Mr. Bjerkan: "Investigations on the Norwegian sprat regarding the average number of vertebrae of the different year classes."
   c) Professor Henking: "Results of the German investigations concerning the catches of the herring larvae in the western and southern part of the Baltic in the autumn of 1928."
   d) Dr. Johansen: "The Results of the Danish experiments with transplantation of young plaice from the North Sea and the Limfjord to the southern Kattegat and the Belt-Sea in the spring of 1928."
2) Professor Knudsen stated that for the study of the exchange of water between the North Sea and the Baltic Sea it would be essential that the periodic oscillations of the boundary layer (internal waves) in the Kattegat and the Belts should be known. He mentioned that the Hydrographic Committee had elected a Sub-Committee for this purpose and desired that this Sub-Committee should include a member of the Transition Area Committee. In accordance with this proposal Dr. Johansen was designated as the representative of the Committee.
3) Dr. Johansen raised the question of a further protection of plaice in the Skagerak and Kattegat; the question was discussed and a recommendation recorded below (II, 2) was adopted by the Committee.
4) Dr. Johansen was re-elected Chairman for the ensuing year.

II. Recommendations.

1) The programme of 1928 (see Proc. Verb., Vol. XLI) was reaffirmed with the following additions:—
   a) Special stress should be laid on the investigations of the stock of plaice in the Skagerak and Kattegat.
   b) The results of the experiments with transplantation of plaice from the North Sea to the Kattegat and Belt-Sea should be closely studied.
   c) The seasonal distribution of the various year-classes of the haddock should be studied.
   d) A special investigation should be made regarding the number of vertebrae of the different year-classes of sprats from Swedish as well as from Norwegian waters.
2) It was recommended that before the next Council Meeting a report on the scientific basis for protectional measures for the plaice in the Skagerak and Kattegat should be worked out.

Comité du Secteur de Transition.

Président: le Dr. A. C. Johansen.
Le Comité se réunit le 10 Avril 1929 à 10h a.m.

I. Compte rendu.

1) Le Comité reçoit les communications suivantes:
   a) Le Dr. Andersson, au nom du Dr. Molander: "Quelques observations concernant le stock du cabillaud dans le Skagerak et le Cattégat".
   b) M. Bjerkan: "Investigations sur le sprat norvégien concernant le nombre moyen de vertèbres des diverses classes annuelles".
   c) Le Prof. Henking: "Résultats des investigations allemandes concernant la pêche des larves de hareng dans les parties occidentale et méridionale de la Baltique en automne 1928".
   d) Le Dr. Johansen: "Résultats des expériences danoises avec transplantation de jeunes plies de la Mer du Nord et du Limfjord dans le Sud du Kattégat et des Belts, au printemps de 1928".
2) Le Professeur Knudsen signale que, pour l'étude des échanges d'eau entre la Mer du Nord et la Mer Baltique, il serait essentiel de connaître les oscillations périodiques de la couche intermédiaire (vagues internes) dans le Cattégat et dans les Belts. Il mentionne que le Comité hydrographique a nommé un Sous-Comité dans ce but et exprime le désir que ce Sous-Comité comprenne un membre du Comité du Secteur de Transition. En accord avec cette proposition le Dr. Johansen est désigné comme délégué du Comité.
3) Le Dr. Johansen soulève la question de la suractivation de la protection de la plie dans le Skagerak et le Cattégat: la question est discutée et une recommandation formulée ci-dessous (II, 2) est adoptée par le Comité.
4) Le Dr. Johansen est réélu Président pour l'année suivante.

II. Recommandations.

1) Le programme de 1928 (voir Rapp. et Proc.-Verbaux Vol. XLI) est confirmé, avec les additions suivantes:
   a) Une attention spéciale devrait être accordée aux investigations sur le stock de plie dans le Skagerak et le Cattégat.
   b) Les résultats des expériences de transplantation de la plie, de la Mer du Nord dans le Cattégat et la Mer des Belts devraient être étudiés de près.
   c) La distribution saisonnière des diverses classes annuelles de l'églefin devrait être étudiée.
   d) Une investigation spéciale devrait être entreprise sur le nombre des vertèbres des diverses classes annuelles de l'esprot des eaux suédoises aussi bien que de celles des eaux norvégiennes.
2) Il est recommandé qu'avant la prochaine réunion du Conseil, un rapport sur la base scientifique des mesures de protection de la plie du Skagerak et du Cattégat soit élaboré.

Baltic Committee.

Chairman: Dr. K. A. Andersson.

The Committee met at 2.30 a.m. on April 10th, 1929.

I. Proceedings.

1) The Administrative Report was adopted.

2) Professor Witting gave a resumé of determinations of ammonia, nitrite, nitrate and phosphate in water samples collected at many stations in the Gulf of Bothnia, the Finnish Bay, and in the Baltic southwards to Gotland.

3) Dr. Johansen made a communication on the spawning period of the cod in the Bornholm region. This period lasted at least from the early spring to the month of August. He pointed out that the long duration of the spawning period might cause some difficulties regarding the age-determination by means of otoliths and scales of older fishes. Some similar conditions were observed regarding the dab.

4) Dr. Fischer reported on the investigations on spring and autumn spawning herring at Rügen and off the coast of East Pomerania, and on the young stages of flatfishes.

5) Dr. Molander gave an account of the rate of growth of the 0-group of flounder in different localities.

6) Professor Siedlecki gave a short communication concerning the collecting of the samples of water taken at regular intervals at 12 different stations in the Gulf of Danzig. He reported also that studies upon the rate of growth of the flatfishes and of the destructive power of the ordinary commercial trawls have been commenced.

7) Dr. Andersson reported on the Swedish herring investigations in the Baltic. He drew attention to the occurrence of herring in the deep water east of Gotland, and gave a resumé of the age-determinations. The year-class from 1924 was predominant and was sufficiently abundant to cause an increase of the catches.

8) Dr. Borowik reported on the Polish investigations concerning the rate of growth of the flounder and of the common dab. He pointed out that the rate of growth of these fishes near the Polish coast is considerably higher than in northern parts of the Baltic Sea, probably owing to the greater abundance of food in the former area.

9) The Committee decided to continue the programme adopted in 1926. The Committee attached special importance to the following points:—
   a) Investigations concerning the effect of the protection of plaice and flounder in the Southern Baltic.
   b) Studies by means of age-determinations on the fluctuation in the stock of herring on the southern and eastern coast of the Baltic for comparison with the fluctuations on the western Baltic coast.
   c) The collection of herring larvae by means of horizontal and vertical hauls with the great Ring-trawl and the Hensen Net respectively.

Comité Baltique.

Président: le Dr. K. A. Andersson.
Le Comité se réunit le 10 Avril 1929 à 2h30 p.m.

I. Compte rendu.

1) Le Rapport administratif est adopté.
2) Le Professeur Witting donne un aperçu sur les déterminations de l'ammoniaque et des nitrites, nitrates et phosphates dans les échantillons d'eau prélevés en un grand nombre de stations du Golfe de Bothnie, de la Baie de Finlande et de la Baltique au Sud de Gotland.
3) Le Dr. Johansen fait une communication sur la période de frayage du cabillaud dans la région de Bornholm. Cette période s'est étendue au moins depuis le premier printemps jusqu'au mois d'août. Il fait ressortir que la longue durée de la période de frayage pourrait occasionner certaines difficultés au sujet de la détermination de l'âge au moyen des otolithes et des écailles des poissons les plus vieux. Quelques conditions semblables ont été notées au sujet de la limande.
4) Le Dr. Fischer fait rapport sur les investigations sur les harengs en frai, de printemps et d'automne, à Rügen et au large de la côte orientale de Poméranie, ainsi que sur les stades jeunes des poissons plats.
5) Le Dr. Molander donne un aperçu sur la rapidité de croissance du groupe 0, du flet, en diverses localités.
6) Le Professeur Siedlecki donne une courte communication sur la collection des échantillons d'eau prélevés à des intervalles réguliers en 12 différentes stations du Golfe de Danzig. Il signale aussi que des études sur la rapidité de croissance des poissons plats et sur le pouvoir destructeur des chaluts commerciaux ordinaires, sont entreprises.
7) Le Dr. Andersson fait rapport sur les investigations sur les harengs de Suède dans la Baltique. Il attire l'attention sur l'occurence du hareng en eau profonde à l'Est de Gotland et donne un résumé de ses déterminations d'âge. La classe annuelle de 1924 était prédominante et assez abondante pour causer un accroissement des captures.
8) Le Dr. Borowik fait rapport sur les investigations polonaises sur la rapidité de croissance du flet et de la limande commune. Il montre que la rapidité de croissance de ces poissons est considérablement plus élevée près de la côte polonaise que dans les parties septentrionales de la Mer Baltique, probablement par suite de l'abondance plus grande de la nourriture dans la première de ces régions.
9) Le Comité décide de conserver le programme adopté en 1926. Il attache une importance spéciale aux points suivants:
   a) Investigations concernant l'effet de la protection de la plie et du flet dans le Sud de la Baltique.
   b) Etudes, par la voie de détermination d'âge, sur les fluctuations du stock de harengs sur les côtes Sud et Est de la Baltique, pour leur comparaison avec les fluctuations de la côte Ouest.
   c) Réunion de larves de hareng au moyen de pêches horizontales et verticales faites, respectivement avec le grand filet annulaire et le filet de Hensen.

d) Further investigations as to ammonia, nitrite, nitrate, and phosphate contents of the water in different parts of the Baltic.

10) Dr. Andersson was re-elected Chairman for the ensuing year.

II. Recommendation.

The Committee recommended the printing of the following report:—

Dr. Chr. Hessle and Dr. S. Wallin: "Investigations of Plankton and its fluctuations in the inner parts of the Baltic during the years 1925—27."

Combined Baltic and Transition Area Committees.

Chairman: Dr. A. C. Johansen.

The Committees met at 4.30 p.m. on April 10th, 1929.

Proceedings.

1) Dr. Andersson gave an account concerning the protection of plaice and flounder in the Baltic. He stated that a meeting of representatives from Denmark, Germany, Poland, Danzig, and Sweden had taken place at Berlin in September, 1928, and that it was agreed at this meeting that a close season (February and March) should be imposed for the plaice, and certain size limits introduced for the plaice and the flounder in the Western and Southern Baltic. These proposals have been adopted by the Governments concerned, and it is expected that they will be put into effect in the very near future.

2) Dr. Andersson drew attention to Professor Henking's special investigations concerning the features distinguishing salmon from trout, and proposed that the Chairman of the two Committees should undertake to compile a list of such features for the practical use of fishermen and dealers, which should be laid before the next joint meeting. Moreover, he thought that investigations should be commenced in the countries bordering the Baltic Sea into the relative frequency and size distribution of salmon and trout in the catches, the purpose of these researches being to furnish a basis for protective measures for these two species.

3) Dr. Fischer made a communication as to the investigations planned in Germany for the study of the effect of the measures for the protection of the plaice and flounder. After discussion, it was agreed that similar investigations should be carried out also from Denmark, Poland, and Sweden.

4) The Committee considered it desirable that the Chairmen for the Baltic and Transition Area Committees should communicate the text of the Convention referred to under Point 1 to the Bureau of the Council when it is signed.

d) Investigations ultérieures sur la contenance en ammoniaque, nitrites, nitrates et phosphates, de l'eau de diverses parties de la Baltique.

10) Le Dr. Andersson est réélu Président pour l'année suivante.

II. Recommandation.

Le Comité recommande l'impression du rapport suivant:

Le Dr. Chr. Hessle et le Dr. S. Wallin: "Investigations sur le plancton et ses fluctuations dans les parties intérieures de la Baltique pendant les années 1925—27".

Comités Combinés de la Baltique et du Secteur de Transition.

Président: le Dr. A. C. Johansen.
Les Comités se réunirent le 10 Avril 1929 à 4h30 p.m.

Compte rendu.

1) Le Dr. Andersson donne un aperçu sur la protection de la plie et du flet dans la Baltique. Il signale qu'une réunion de délégués du Danemark, de l'Allemagne, de la Pologne, de Danzig et de la Suède a eu lieu à Berlin en Septembre 1928 et qu'il a été convenu à cette réunion, qu'une saison close devrait être imposée pour la plie (février et mars) et qu'une certaine limite de taille devrait être introduite pour la plie et le flet, dans la Baltique occidentale et méridionale. Ces propositions ont été adoptées par les Gouvernements intéressés et on pense qu'elles seront mises en vigueur dans un avenir très prochain.
2) Le Dr. Andersson appelle l'attention sur les investigations spéciales du Dr. Henking sur les caractères distinctifs du saumon et de la truite. Il propose que les Présidents des deux Comités entreprennent de constituer pour l'usage pratique des pêcheurs et des marchands, une liste de ces caractères, qui devrait être présentée à la prochaine Réunion combinée. En outre, il est d'avis que des investigations devraient être entamées, dans les Pays riverains de la Mer Baltique, sur la fréquence relative et sur la distribution des tailles du saumon et de la truite dans les captures, le but de ces recherches serait de fournir une base à des mesures protectives pour ces deux espèces.
3) Le Dr. Fischer présente une communication sur les investigations projetées en Allemagne pour l'étude de l'effet produit par les mesures prises pour la protection de la plie et du flet. Après discussion il est convenu que des investigations semblables devront être instituées aussi en Danemark, en Pologne et en Suède.
4) Le Comité juge désirable que les Présidents des Comités Baltique et du Secteur de Transition communiquent au Bureau du Conseil le texte de la Convention mentionnée au Point 1 aussitôt qu'elle sera signée.

Programmes and Reports of other Committees.

Hydrographic Committee.

Chairman: Professor Martin Knudsen.

The Committee met at 4 p.m. on April 8th and at 2,30 p.m. on April 11th, 1929.

The following recommendations were passed by the Committee:—

1) The Committee expressed its deep interest in the working out and publication of daily charts and tables giving observations of the surface temperature of the Atlantic in tenths of a degree Centigrade; likewise in the working out and publication of decade and monthly charts showing the mean temperature anomalies.

The Committee is in favour of the continued discussion of the subject with the Danish Meteorological Institute, and expresses the hope that the work on the lines indicated above may be carried out soon.

2) The Committee recommended that the work in progress on the determination of salinity-normals should be continued according to the scheme adopted at the Council Meeting in 1928. The Committee approved of the work hitherto carried out at the Service Hydrographique, and recommended that assistance should be available in order to hasten the completion of the work.

3) The question of rapid dissemination of information on the hydrography of the North Sea was referred to the Combined North Sea Committee.

4) For the study of the exchange of water between the North Sea and the Baltic Sea was considered essential that the periodic oscillations of the boundary layer (internal waves) in the Kattegat and the Belts should be known. It is therefore recommended that those States which are particularly interested, i.e. Denmark, Germany and Sweden, should undertake the investigation in common.

For this purpose the Hydrographic Committee and the Transition Area Committee have set up a Committee consisting of Prof. Otto Pettersson, Dr. Jacobsen, Dr. Johansen, Prof. Schulz (Chairman), and Prof. Witting. It is proposed that this recommendation should be confirmed by the Council.

Plankton Committee.

Chairman: Professor C. H. Ostenfeld.

The Committee met at 9.30 a.m. on April 9th, 1929.

I. Proceedings.

1) Professor Mielck presented the report of Dr. Künne on the comparative catching power of various types of plankton nets, and distributed a typewritten summary, which was discussed.

Programmes et Rapports des autres Comités.

Comité Hydrographique.

Président: le Professeur Martin Knudsen.
Le Comité se réunit le 8 avril à 4h p. m. et le 11 avril à 2h30 p. m. 1929.

Les recommandations suivantes sont votées par le Comité:—

1) Le Comité exprime le vif intérêt qu'il prend à l'élaboration et la publication de cartes journalières et de tables indiquant les observations de la température de surface faites dans l'Atlantique, au dixième de degré, et aussi à celle de cartes décadaires et mensuelles montrant les anomalies de température moyenne.

Le Comité est favorable à la continuation de la discussion de cette question avec l'Institut météorologique danois; il exprime l'espoir de voir bientôt le travail poursuivi sur les bases indiquées plus haut.

2) Le Comité recommande que le travail en cours sur la détermination des normales de salinité soit continué conformément au plan qui a été adopté à la réunion du Conseil en 1928. Il approuve le travail accompli jusqu'ici au Service Hydrographique et recommande que de l'assistance puisse être obtenu afin d'accélérer l'achèvement de l'entreprise.

3) La question de la diffusion rapide de l'information au sujet de l'hydrographie de la Mer du Nord sera portée devant le Comité combiné de la Mer du Nord.

4) Au sujet de l'échange des eaux entre la Mer du Nord et la Baltique, il est considéré comme essentiel que les oscillations périodiques de la zone limite (vagues internes) dans le Cattégat et dans les Belts soient connues. C'est pourquoi il est recommandé que les Etats qui y sont particulièrement intéressés, c'est à dire le Danemark, l'Allemagne et la Suède entreprennent l'investigation en commun.

A cet effet le Comité Hydrographique et le Comité du Secteur de Transition ont institué un Comité comprenant le Prof. Otto Pettersson, le Dr. Jacobsen, le Dr. Johansen, le Prof. Schulz (Président) et le Prof. Witting. On propose que cette recommandation soit confirmée par le Conseil.

Comité du Plancton.

Président: le Professeur C. H. Ostenfeld.
Le Comité se réunit le 9 Avril 1929 à 9h30 a.m.

I. Compte rendu.

1) Le Professeur Mielck présente le rapport du Dr. Künne sur le pouvoir de capture comparatif de divers types de filets à plancton, et distribue un sommaire dactylographié, qui est discuté.

2) Professor GRAN initiated a discussion on the quantitative methods used in different countries in the investigation of phytoplankton.
3) After a discussion concerning participation in a Scientific Meeting at the next Meeting of the Council, it was decided to recommend to the Consultative Committee that the relation between P_H and CO_2 in correlation with the growth of the plankton would be a suitable subject.
4) The Chairman laid before the Committee a preliminary paper giving a summary of the Resumé Planctonique.
5) Professor OSTENFELD was re-elected Chairman for the ensuing year.

II. Recommendations.

1) It was recommended that the report by Dr. KÜNNE should be published and that the remainder of the grant given last year for these investigations should be used for the purpose. It was further recommended that any possible surplus should be placed at the disposal of Professor MIELCK for the carrying out of further investigations on the catching power of plankton nets.
2) It was recommended that the Chairman's paper — General Summary of the "Resumé Planctonique"— should be published by the Council.

Statistical Committee.

Chairman: Mr. DAVID T. JONES.

The Committee met at 2.30 p.m. on April 9th, 1929.

The Chairman communicated an apology from Professor D'ARCY W. THOMPSON for his absence.

Proceedings.

1) The Statistical Bulletin for 1926 was laid on the table, and Captain SCHÖNING expressed a hope that the Bulletin for 1927 would be ready for circulation early in August.
2) It was decided to include in the Bulletin Statistique for 1928 a table showing for the North Sea the catch by each of the main methods of fishing per day's absence from port: the table to be prepared from the combined catches of as many countries as possible, and to give both total catch and those of each of the principal species separately.
3) The Committee agreed that a summary of the answers which have been received from the various countries to the questionnaire regarding the basis of their fishery statistics, should be prepared and incorporated as an appendix to the Bulletin for 1927.
4) After discussion it was agreed that commencing with the Bulletin for 1928, all fish landed should be shown in the tables under the country to which the catching vessel belonged.
5) Professor D'ARCY W. THOMPSON was re-elected Chairman for the ensuing year.

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2) Le Professeur Gran entame la discussion sur les méthodes quantitatives usitées dans divers Pays pour l'investigation du phytoplancton.
3) Après une discussion concernant la participation à une Réunion scientifique lors de la prochaine Réunion du Conseil, on décide de recommander au Comité consultatif la relation entre le P_H et le CO_2, en corrélation avec le développement du plancton, comme étant un sujet opportun.
4) Le Président présente au Comité un travail préliminaire donnant un sommaire du "Résumé Planctonique".
5) Le Professeur Ostenfeld est réélu Président pour l'année suivante.

II. Recommandations.

1) Il est recommandé que le rapport du Dr. Künne soit publié et que le reliquat du subside accordé l'an dernier pour ces investigations soit affecté au même but. Il est recommandé en outre que le surplus éventuel soit mis à la disposition du Professeur Mielck pour l'exécution d'autres investigations sur le pouvoir capturant des filets à plancton.
2) Il est recommandé que le travail du Président — Sommaire général du "Résumé Planctonique" — soit publié par le Conseil.

Comité Statistique.

Président: M. David T. Jones.
Le Comité se réunit le 9 Avril 1929 à 2h30 p.m.
Le Président présente les excuses du Professeur D'Arcy W. Thompson pour son absence.

Compte rendu.

1) Le Bulletin statistique pour 1926 est déposé et le Capitaine Schöning exprime l'espoir que le Bulletin pour 1927 sera prêt à être distribué au commencement d'août.

2) Il est décidé d'inclure dans le Bulletin statistique pour 1928 une table montrant, pour la Mer du Nord, la capture par jour d'absence du port, par chacune des principales méthodes de pêche. Cette table devra être dressée à l'aide des captures combinées du plus grand nombre possible de Pays et fournir à la fois la capture totale et la capture de chacune des principales espèces séparément.

3) Le Comité décide qu'un sommaire des réponses au questionnaire concernant la base de la statistique de pêcherie, qui ont été reçues des divers Pays sera préparé et incorporé en appendice au Bulletin pour 1927.

4) Après discussion il est décidé qu'à partir du Bulletin pour 1928 tout poisson débarqué figurera dans les tables du Pays auquel le navire capteur appartient.

5) Le Professeur D'Arcy W. Thompson est réélu Président pour l'année suivante.

Limnological Committee.

Chairman: Professor HENKING.
The Committee met at 9.30 a.m. on April 9th, 1929.

I. Proceedings.

1) The Chairman communicated to the Committee the first part of his Report (see Rapports et Procès-Verbaux, Vol. XLV, p. 80) dealing with racial studies of salmon and trout. The Committee discussed the Report at some length.
2) The various members of the Committee gave brief accounts of the work carried out in their respective countries during 1928 in so far as it concerned the programme of the Limnological Committee.
3) Professor ROULE gave some account of the investigations carried out by the Sub-Committee appointed for the study of salmon in the area between Great Britain, Ireland, France and Spain.
4) A general discussion took place on the prevalence of furunculosis in various countries and on the conditions which appear to favour outbreaks of this disease. A recommendation on this subject was adopted (see below II, 5).
5) Professor HENKING appealed for further assistance in collecting the Laws and Regulations governing the close seasons and size limits for salmon and sea trout in each country (see Rapports et Procès-Verbaux, Vol. XLV, p. 80).
6) Professor HENKING was re-elected as Chairman for the ensuing year.

II. Recommendations.

1) That Part I of Professor HENKING's Report dealing with racial studies of salmon and Sea Trout should be published, and that a honorarium should be given to the author, who should be asked to prepare Part II of his Report.
2) That the Sub-Committee appointed for the study of the salmon in the area between Great Britain, Ireland, France and Spain be asked to continue its work. Professor ROULE was re-elected as Chairman of the Sub-Committee.
3) That the programme for the ensuing year be the same as that adopted in 1928, but with the addition that special attention should be paid to the investigation of furunculosis.
4) That for France and Spain the following programme be carried out:—
   a) Observations on the ascent of the rivers of Northern Spain by salmon during the autumn of 1929.
   b) Observations concerning the ascent of the rivers and the spawning of shad in Spain and France.
5) That the bacteriologists engaged in the study of fish diseases, particularly furunculosis, in different countries, should exchange cultures of pathogenic bacteria, specimens of infected fish and relevant information with a view to the precise determination of the organisms concerned.

Comité Limnologique.

Président: le Professeur Henking.
Le Comité se réunit le 9 Avril 1929 à 9h30 a.m.

I. Compte rendu.

1) Le Président communique au Comité la première partie de son Rapport (voir les Rapports et Procès-Verbaux, Vol. XLV, p. 81) traitant de l'étude des races du saumon et de la truite. Le Comité soumet ce rapport à une assez longue discussion.
2) Les divers membres du Comité présentent un bref aperçu du travail exécuté dans leurs Pays respectifs en 1928, pour autant qu'il concerne le programme du Comité limnologique.
3) Le Professeur Roule donne un aperçu des investigations accomplies par le Sous-Comité nommé pour l'étude du saumon dans le Secteur compris entre la Grande Bretagne, l'Irlande, la France et l'Espagne.
4) Une discussion générale se poursuit sur la furonculose dans divers Pays et sur les conditions qui paraissent favoriser l'éclosion de cette maladie. Une recommandation sur ce sujet est adoptée (voir ci-dessous II, 5).
5) Le Professeur Henking réclame assistance pour la réunion des Lois et Règlements fixant la clôture des saisons et la limite de taille pour le saumon et la truite de mer dans chacun des Pays (voir: Rapports et Procès-Verbaux, Vol. XLV, p. 81).
6) Le Professeur Henking est réélu Président pour l'année suivante.

II. Recommandations.

1) Que la Partie I du Rapport du Professeur Henking traitant de l'étude des races du saumon et de la truite de mer soit publiée et qu'un honoraire soit accordé à l'auteur à qui il sera demandé de préparer la Partie II de ce Rapport.

2) Que le Sous-Comité nommé pour l'étude du saumon dans le secteur compris entre la Grande Bretagne, l'Irlande, la France et l'Espagne, soit prié de continuer son travail. Le Professeur Roule est réélu Président de ce Sous-Comité.

3) Que le programme de 1928 soit réadopté pour l'année prochaine, mais avec l'addition qu'une attention spéciale doit être accordée à l'investigation sur la furonculose.

4) Que le programme suivant soit exécuté par la France et l'Espagne:—
   a) Etude pendant l'automne de 1929, de la montée du saumon dans les cours d'eau du Nord de l'Espagne.
   b) Etude de la montée et de la ponte de l'alose en Espagne et en France.

5) Que les bactériologistes occupés à l'étude des maladies de poissons en divers pays — particulièrement de la furonculose — échangent des cultures de bactéries pathogènes, des spécimens de poissons infectés et des informations connexes en vue de préciser la détermination des organismes correspondants.

Editorial Committee.

Chairman: Prof. O. Pettersson.
The Committee met at 10 a.m. on April 11th, 1929.

A proposal by the Bureau for rules governing the cost of publications was considered and discussed. It was adopted in the following form:—

1) The Publication of Rapports and Procès-Verbaux should be classified as follows:—
   a) Reports of Council Meetings.
   b) Reports of Area Committees.
   c) Reports of Special Committees.
   d) Scientific Reports by members or others.
2) Reports of Area Committees and of Special Committees are to be limited to a maximum of 100 pages, provided that it shall be in the discretion of the Consultative Committee to recommend an extension of the limit in special cases.
3) The decision whether reports falling within Category (d) should be accepted for publication by the Council in the Rapports and Procès-Verbaux rests with the Chairman of the Editorial Committee, who may call upon advisers who are experts in the respective subjects. It will be the duty of the Chairman to see to it that the rules contained in Paragraphs 2 and 7 hereof are observed. In case of dispute, the Chairman will, of course, refer to the Bureau.
4) Detailed reports of the investigations carried out by the participating countries will not, as a rule, be published in the Reports of Area Committees, which should contain only resumés. The full reports should be published on the responsibility and at the cost of the country in question.
5) Authors must write their reports in a concentrated form and limit the publication of the tables and charts. The tables and charts might be considerably restricted if information is given as to where the original material is deposited and can be consulted.
6) Attention is directed to the recommendation of the Editorial Committee of September, 1926, (see Proc.-Verb. Vol. XLI, p. 98, item 6) and in addition to this authors should be requested to prepare carefully and number clearly the legends for the figures when sending in manuscripts. Furthermore, when an author desires a third proof-print of his paper he must pay the cost of the corrections in this last proof-print.
7) Authors must announce, and, if possible, send to the Bureau their publications in good time — at least a month — before the Council Meeting. They must if possible indicate the size of each report, the number of figures, etc., in order that an estimate of cost may be laid before the Council at the meeting.
8) The total estimate for publications falling within the above-named categories (including cost of distribution) must not be exceeded without reference to the Bureau.

Copies of the first part of Professor Joubin's illustrations of the Atlantic Fauna, which according to the Council's Resolution of last year had been printed in Paris, were

Comité Editorial.

Président: le Professeur O. Pettersson.
Le Comité se réunit le 11 Avril 1929 à 10h a.m.

Une proposition du Bureau établissant des règles à imposer au coût des publications est prise en considération et discutée. Elle est adoptée sous la forme suivante:—

1) La publication des Rapports et Procès-Verbaux doit être subdivisée comme suit:—
   a) Procès-Verbaux des Réunions du Conseil.
   b) Rapports des Comités des Secteurs.
   c) Rapports des Comités spéciaux.
   d) Rapports scientifiques des membres ou d'autres personnes.
2) Les rapports des Comités des Secteurs et des Comités spéciaux seront limités à un maximum de 100 pages, mais il sera laissé à la discrétion du Comité consultatif de recommander une extension de cette limite dans des cas spéciaux.
3) En cas de doute au sujet de l'acceptation pour la publication par le Conseil dans les Rapports et Procès-Verbaux, de travaux tombant dans la catégorie (d) la décision est laissée au Président du Comité Editorial. Celui-ci peut demander avis à des experts sur les sujets traités. Le Président aura pour devoir de veiller à ce que les règles formulées aux paragraphes 2 et 7 soient observées. En cas de désaccord le Président pourra en référer au Bureau.
4) Des rapports détaillés sur les investigations conduites par les Pays participants, en règle générale, ne seront pas publiés dans les Rapports des Comités des Secteurs qui ne doivent contenir que des résumés. Les rapports *in extenso* devront être publiés sous la responsabilité des Pays en question et à leurs frais.
5) Les auteurs doivent rédiger leurs rapports sous une forme concentrée et restreindre la publication des tableaux et des cartes. On pourrait limiter considérablement les tableaux et les cartes en faisant connaître l'endroit où le matériel d'origine est déposé et peut être consulté.
6) L'attention est attirée sur la recommandation faite par le Comité Editorial en Septembre 1926 (voir Rapp. et Procès-Verbaux Vol. XLI, p. 99, No. 6) et, en outre, les auteurs devront être priés de préparer avec soin et de numéroter clairement les légendes de leurs figures, lors de l'envoi des manuscrits. De plus, lorsqu'un auteur désire une troisième épreuve de son texte, il doit payer les corrections faites à cette dernière épreuve.
7) Les auteurs doivent annoncer leurs publications et, si possible, les envoyer au Bureau en temps opportun, au moins un mois avant la réunion du Conseil. Ils doivent, autant que possible, indiquer l'étendue de chaque rapport, le nombre des figures, etc., afin qu'une estimation du coût puisse être présentée au Conseil lors de la Réunion.
8) L'estimation totale du coût des publications qui tombent dans les catégories indiqués ci-dessus (et de leur distribution) ne peut pas être dépassée sans qu'il en soit référé au Bureau.

Des exemplaires de la première partie des illustrations de la Faune Atlantique du Professeur Joubin, qui, en exécution d'une décision prise par le Conseil l'an dernier,

laid on the table. Professor JOUBIN informed the Committee that 500 copies had been printed of Part 1, and that the preparation of further volumes was in progress. As the ordinary edition of the Council's publications is 800 copies the Committee recommended:

> That in future 800 copies should be printed and that an extra 300 copies of Part 1 should be reprinted when the stock was exhausted.

The Manuscript of a report by Dr. BÜCKMANN on the results of experiments with Savings Gear had been sent in, and further reports on this question were announced. It was recommended:—

> That the Reports from the various countries concerning experiments with Savings Gear should be published in the Journal provided that they were not too large.

Professor EHRENBAUM laid before the Committee the Index which he had prepared in accordance with the Council's Resolution of last year. He suggested that the index should be brought up to date so that it would include the Rapp. and Proc.-Verb. up to Vol. LV and all Publ. de Circ. The printing cost had been estimated to be about 1,065 Kr. It was recommended that it should be printed.

A paper by Dr. EICHELBAUM had been announced; it was ready, but not yet received. It was recommended that it should be published by the Council.

Prof. HENKING's Report on Salmon and Sea Trout prepared at the request of the Council at the last meeting of the Council was laid on the table. The Committee recommended that it be published.

It was decided that Area Committee Reports should be sent direct to the Administrative Secretary.

It was further recommended that a definite list of the papers received for publication before each Council Meeting should be laid before the Editorial Committee during the Meeting.

The Committee considered the possibility of reducing the selling price of the Council's publications (except the Journal) by one-third in order that they might find a readier sale. It was agreed to refer this matter to the Bureau.

The Committee recommended that a grant of 800 Kr. be voted for the Library of the Council for binding of books, etc., as had been done last year.

ont été imprimés à Paris, sont déposés sur la table. Le Professeur JOUBIN fait savoir au Comité que 500 exemplaires de la Partie I ont été tirés à Paris, et que la préparation des volumes suivants est en bonne voie. Vu que l'édition ordinaire des publications du Conseil est de 800 exemplaires, le Comité recommande:—

Qu'à l'avenir il sera tiré 800 exemplaires et qu'après l'épuisement de la Partie I, 300 exemplaires supplémentaires devront être réimprimés.

Le manuscrit d'un rapport par le Dr. BÜCKMANN, sur les résultats des expériences faites avec des engins épargneurs a été envoyé et des rapports ultérieurs sur cette question sont annoncés. Il est recommandé:—

Que les rapports des divers Pays concernant des expériences sur des Engins Épargneurs soient publiés dans le Journal, pourvu qu'ils ne soient pas trop étendus.

Le Professeur EHRENBAUM présente au Comité l'Index qu'il a préparé conformément à la Résolution du Conseil prise l'an dernier. Il propose que cet Index soit mis au courant de manière à comprendre les Rapports et Procès-Verbaux jusqu'au Volume LV et toutes les Publications de Circonstance. Le coût d'impression a été estimé à environ 1,065 Couronnes. Son impression est recommandée.

Un travail du Dr. EICHELBAUM est annoncé comme achevé, mais n'est pas encore arrivé. Il est recommandé que ce travail soit publié par le Conseil.

Le rapport du Professeur HENKING sur le saumon et la truite de mer, préparé à la demande du Conseil à sa dernière Réunion est déposé. Le Comité recommande qu'il soit publié.

Il est décidé que les Rapports des Comités des Secteurs seront envoyés directement au Secrétaire Administratif.

Il est aussi recommandé qu'une liste complète des travaux reçus pour la publication, avant chaque Réunion du Conseil, soit soumise au Comité Editorial au cours de la Réunion.

Le Comité examine la question de la possibilité de réduire d'un tiers le prix de vente des publications du Conseil (le Journal excepté), en vue d'en obtenir une meilleure vente. On est d'accord pour en référer au Bureau.

Le Comité recommande qu'un subside de 800 couronnes soit voté pour la bibliothèque du Conseil, comme l'année passée pour la reliure des ouvrages, etc.

Whaling Committee.

Chairman: Prof. Johan Hjort.

The Committee met at 9.30 a.m. on April 9th and at 3 p.m. on April 10th, 1929.

I. Proceedings.

The following statement was discussed:—

1) The International Council has, through its Whaling Committee, had under consideration the effects of modern developments in the whaling industry upon the world stock of whales.

2) While fully admitting that it is not likely that any definitive results can be derived from the scientific researches now in progress until a considerable time has elapsed, the Committee feels strongly that the enormous expansion of the whaling industry in recent years constitutes a real menace to the maintenance of the stocks of whales, and that if the expansion continues at the present rate there is a real risk of those stocks being so reduced as to cause serious detriment to the industry.

3) While admitting that until the scientific researches have reached a definite conclusion it will be impossible to devise any measures of protection of a permanent nature, the Committee is of opinion that the Governments of the countries interested in whaling should, as a matter of urgency, give serious consideration to the question of taking immediately temporary measures for dealing with the situation.

4) The following measures have been suggested in various quarters as suitable for immediate adoption in order to deal with the situation, viz.:—
   a) Stipulations as to the extent to which carcases of whales killed must be utilised.
   b) Prohibition of killing certain species of whales — principally right whales.
   c) Protection of cows with calves and immature whales.
   d) Prohibition or restriction of the capture of whales in certain regions, e.g. the capture of certain species of whales in the tropics.
   e) Some effective restriction of the capture of all species of whales in the Antarctic. The Committee hesitates to suggest what restrictions would be useful or practicable in this sea; but considers that it is urgently necessary that means of restriction should be found.
   f) Regulation of the method of payment of crews of whaling ships in such manner as to secure that their remuneration is not directly dependent on the number of whales killed.

5) In order to bring these measures into force it would be necessary for uniform legislation to be passed in as many maritime countries as possible.

6) The Whaling Committee recommend that the Council shall suggest to the Governments concerned the desirability of giving favourable and early consideration to the above suggestions.

Comité de la Baleine.

Président: le Professeur Johan Hjort.
Le Comité se réunit le 9 Avril 1929 à 9h30 a.m. et le 10 Avril à 3h p.m.

I. Compte rendu.

L'exposé suivant est discuté:—

1) Le Conseil International, par son Comité de la Baleine, a pris en considération les effets du développement moderne de l'industrie baleinière sur le stock mondial des cétacés.

2) Le Comité admet parfaitement qu'il n'est guère probable que l'on puisse d'ici à quelque temps, tirer des conclusions définitives des recherches scientifiques actuellement en cours. Mais il a l'intime conviction que l'énorme extension que l'industrie baleinière a prise dans ces dernières années menace réellement le maintien du stock des baleines, et que si cette extension se poursuit avec la même intensité, ces stocks courent réellement le risque de se trouver réduits au point de causer à cette industrie un sérieux dommage.

3) Le Comité admet donc qu'il sera impossible de prendre des mesures de protection d'un caractère permanent avant que les recherches scientifiques soient arrivées à des conclusions bien définies. Mais il est d'avis que les Gouvernements des Pays intéressés à l'industrie baleinière doivent, de toute urgence, prendre en sérieuse considération la question de l'adoption immédiate de mesures temporaires pour faire face à la situation.

4) Les mesures suivantes ont été suggérées, de différentes sources, comme de nature à pouvoir être immédiatement adoptées pour faire face à cette situation:—
   a) Stipulation au sujet du degré auquel doit être poussée l'utilisation des cadavres des baleines tuées.
   b) Prohibition de tuer certaines espèces de baleines, en particulier la baleine franche.
   c) Protection des femelles avec baleineaux et des baleines immatures.
   d) Prohibition ou restriction de la capture des baleines dans certaines régions et particulièrement la capture de certaines espèces de baleines sous les tropiques.
   e) Certaines restrictions efficaces de la capture de toutes les espèces de baleines dans l'Antarctique. Le Comité hésite à suggérer des restrictions qui seraient efficaces ou praticables dans cette région, mais il considère comme instamment nécessaire que l'on trouve des moyens de restriction.
   f) Réglementation de la méthode de paiement des équipages des navires baleiniers de manière à assurer ce résultat: que leur rémunération ne soit plus directement dépendante du nombre de baleines tuées.

5) Pour arriver à mettre ces mesures en vigueur il serait nécessaire qu'une législation uniforme soit adoptée dans le plus grand nombre possible de Pays maritimes.

6) Le Comité de la Baleine recommande que le Conseil fasse remarquer aux Gouvernements intéressés qu'il est désirable qu'une attention immédiate et favorable soit accordée aux suggestions formulées ci-dessus.

II. Recommendations.

1) The Committee was unanimous in asking the Council to request the Norwegian Government to organize a central institution to collect statistics from the whaling industry throughout the world, on the understanding that a report be laid before this Committee yearly; and further the Committee requested that the suggestions made during the discussion be taken into account in framing the constitution of this body and arranging the programme for its work[1]).
2) The Committee recommended the adoption of the statement given above.
3) The Committee recommended:—
   a) That it would welcome further investigations in the Antarctic, especially such as would be complementary in character to those of the Discovery Committee;
   b) That every effort should be made to secure close touch and cooperation between such expeditions and the Discovery investigations;
   c) That Professor Hjort be asked to consult the Discovery Committee as to the possibility of such cooperation, and to report thereon to the Committee at the next Meeting.

Saving Gears Committee.

Chairman: Prof. O. Pettersson.
The Committee met at 3.30 a.m. on April 10th, 1929.

I. Proceedings.

1) Dr. Tesch presented a report on comparative experiments made in Holland with the Ridderstad Trawl and a Dutch type of gear known as the Gelder Trawl.
2) Dr. Bückmann gave an account of experiments with the Swedish Saving Trawl and other apparatus. Experiments had also been commenced with a new model "Eilt-Jacobs". With this gear no definite results, however, had yet been reached.
3) Dr. Bowman reported on comparative experiments with the ordinary otter and the Vigneron-Dahl trawls.

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[1]) The suggestions referred to are the following:—

1) That statistics should be collected from all countries, including those outside the Council.
2) That, so far as possible, statistics of past years — at any rate, for all years since the war — from all countries should be brought together and examined.
3) That each year a list of all whaling stations operating should be made, with a statement of the number of catchers employed.
4) That, if possible, a statistical statement should be issued annually.
5) That the statistical forms recommended by the Paris Meeting of the Whaling Committee should be adopted universally.
6) That in all records and statistical statements as to length of whales, the particular unit employed (Meter, English foot, Norwegian foot) should be clearly stated.

II. Recommandations.

1) Le Comité, à l'unanimité, demande au Conseil d'inviter le Gouvernement norvégien à organiser une Institution centrale pour concentrer la statistique de l'industrie baleinière du monde entier, et qu'il soit entendu qu'un rapport annuel sera soumis au Comité. En outre, le Comité demande que les propositions formulées au cours de la discussion soient prises en considération dans la constitution de cet organisme et dans l'établissement de son programme de travail[1]).
2) Le Comité recommande l'adoption de l'exposé ci-dessus.
3) Le Comité recommande:—
   a) que les investigations ultérieures dans l'Antarctique soient favorisées et tout spécialement celles qui auraient un caractère complémentaire de celles du Comité du "Discovery";
   b) que tous les efforts possibles soient faits pour assurer un contact étroit et une collaboration entre ces expéditions et les investigations du Discovery;
   c) que l'on demande au Prof. Hjort de consulter le Comité du Discovery au sujet de la possibilité de cette coopération et de faire rapport à son sujet au Comité, à la Réunion de l'an prochain.

Comité des Engins Épargneurs.

Président: le Professeur O. Pettersson.
Le Comité se réunit le 10 Avril 1929 à 3h30 p.m.

I. Compte rendu.

1) Le Dr. Tesch présente un rapport sur des expériences comparatives faites en Hollande avec le chalut de Ridderstad et avec un type hollandais d'engin appelé "le Chalut de Gelder".
2) Le Dr. Bückmann fait rapport sur les expériences pratiquées avec le chalut suédois et avec d'autres appareils. Des expériences ont aussi été entamées avec un nouveau modèle, le chalut "Eilt Jacobs". Cependant on n'a pas encore obtenu de résultats bien définis avec ce dernier.
3) Le Dr. Bowman fait rapport sur des expériences comparatives conduites avec le chalut à panneaux ordinaire et le chalut Vigneron-Dahl.

[1]) Les suggestions mentionnées sont les suivantes:
1) que des statistiques soient recueillies dans tous les pays, y compris ceux qui ne sont pas adhérents au Conseil.
2) que les statistiques des années passées — ou, du moins de toutes les années depuis la guerre — et de tous les pays soient, autant que possible, concentrées et examinées.
3) qu'une liste annuelle de toutes les stations baleinières en activité soit élaborée, avec l'indication du nombre des pêcheurs employés.
4) qu'un rapport statistique soit publié chaque année, si possible.
5) que les formules statistiques recommandées par la Réunion du Comité de la Baleine tenue à Paris soient adoptées universellement.
6) que dans toutes les notes et tous les exposés statistiques, concernant la longueur des cétacés, l'unité particulière employée (mètre, pied anglais ou pied norvégien) soit nettement exposée.

4) Dr. DA CUESTA stated that a report on the experiments carried out in Spain had already been published. The method had been somewhat altered on account of the form of the Spanish towed nets.
5) Dr. JOHANSEN stated that the Danish experiments had been restricted to experiments with the Danish plaice-seine with various sizes of meshes.
6) Dr. ANDERSSON informed the Committee that the results of the Swedish experiments had been published and he referred to this publication.
7) Dr. BOROWIK gave an account of the Polish experiments carried out from commercial vessels, and concerning experiments carried out in tanks.
8) A discussion occurred as to the publication of the reports received. Dr. JOHANSEN was in favour of printing, while Professor MIELCK thought that duplication would be sufficient.

II. Recommendation.

The Committee recommended that a grant should be made for the further work along the same lines as those already followed.

4) Le Dr. Da Cuesta signale qu'un rapport sur les expériences faites en Espagne a déjà été publié. La méthode a été un peu modifiée à cause de la forme des filets traînants espagnols.
5) Le Dr. Johansen dit que les recherches danoises se sont bornées à des expériences avec des seines danoises de plie, à mailles de diverses dimensions.
6) Le Dr. Andersson fait connaître au Comité que les résultats des expériences suédoises ont déjà été publiés et il renvoie à cette publication.
7) Le Dr. Borowik rend compte des expériences polonaises conduites sur des navires commerciaux et rapporte certaines expériences pratiquées dans des réservoirs.
8) Une discussion se produit au sujet de la publication des rapports. Le Dr. Johansen se déclare en faveur de l'impression, tandis que le Professeur Mielck pense qu'une simple multiplication dactylographique suffirait.

II. Recommandation.

Le Comité recommande qu'un subside soit accordé pour la continuation du travail dans les mêmes voies.

Reports of Scientific Meetings.

Fluctuations in the Fisheries.

Held at the Offices of the Zoological Society on April 12th, 1929, at 10 a.m.
Chairman: Professor Johan Hjort.

The members were welcomed by the Secretary of the Zoological Society, Dr. P. Chalmers Mitchell, who gave a short account of the Society's activities, especially in connexion with the exhibition of aquatic animals.

After a general statement by the Chairman, the following scientific communications were made:—

1) Oscar Sund: The Renewal of a Fish Population studied from Measurements of Commercial Catches.
2) D'Arcy W. Thompson: On the Scottish Market Statistics of the Adult Cod.
3) Erik M. Poulsen: On the Fluctuations in the Abundance of Cod Fry in the Kattegat and the Belt Sea and Causes of the same (communicated by Dr. Johansen).
4) G. Rollefsen: On the susceptibility of Cod eggs to injury by Shock or Touch (communicated by Mr. Sund).
5) H. Thompson: Haddock Fluctuations.
6) G. Belloc: Note on the behaviour of the Hake (*Merlucius merluccius* L.) during the first growth period.
7) A. Bückmann: On the Fluctuations in the Stock of the Common Sole of the German Bight.
8) Miss Thursby-Pelham: On the Fluctuations in the Age-Composition of the Plaice stock in the Southern North Sea during 1923—1928.
9) A. C. Johansen: On a Correlation between the yearly Catch of Herring in the Sound and the Abundance of Herring larvae in Autumn.
10) F. de Buen: Fluctuations in the Sardine fisheries of Spain.
11) Einar Lea: Mortality in the stock of grown Norwegian Herring.
12) K. A. Andersson: Fluctuations in the abundance of Herrings in the Baltic and the Sound.
13) G. P. Farran: Fluctuations in the Stock of Herrings on the North Coast of Donegal.
14) W. C. Hodgson: Herring Fluctuations.
15) H. Lissner: Fluctuations in the German Trawl Herring Fishery.
16) J. J. Tesch: Investigations of Year-classes of Herring in the Southern North Sea.
17) Jean le Gall: Biological Statistics and Considerations on the Herring populations of the eastern part of the English Channel.

Rapports des Réunions Scientifiques.

Fluctuations de la Pêcherie.

La Réunion se tient dans les bureaux de la Société Zoologique le 12 Avril 1929 à 10h a.m.
Président: le Professeur Johan Hjort.

Les membres sont reçus par le Secrétaire de la Société Zoologique le Dr. P. Chalmers-Mitchell, qui expose un court aperçu de l'activité de la Société, particulièrement dans ses rapports avec l'exhibition des animaux aquatiques.

Après un aperçu général exposé par le Président, les communications scientifiques suivantes sont présentées:—

1) Oscar Sund: Le renouvellement d'une population de poissons étudié d'après les mensurations de captures commerciales.
2) D'Arcy W. Thompson: Sur la statistique écossaise du marché de cabillaud adulte.
3) Erik M. Poulsen: Sur les fluctuations de l'abondance du fretin de cabillaud dans le Cattégat et dans la Mer des Belts, et sur la cause de ces fluctuations (communiqué par le Dr. Johansen).
4) G. Rollefson: Sur la susceptibilité des œufs du cabillaud aux avaries par le choc ou le contact (communiqué par M. Sund).
5) H. Thompson: Fluctuations de l'églefin.
6) G. Belloc: Note sur le comportement du merlu (*Merlucius merluccius*) pendant la première période de croissance.
7) A. Bückmann: Sur les fluctuations du stock de la sole commune de la Mer Allemande.
8) Miss Thursby-Pelham: Sur les fluctuations de la composition en groupes d'âge du stock de la plie dans le Sud de la Mer du Nord pendant la période 1923—1928.
9) A. C. Johansen: Sur l'existence d'une corrélation entre la capture annuelle du hareng dans le Sund et l'abondance des larves de hareng en Automne.
10) F. de Buen: Fluctuations des pêcheries de sardine en Espagne.
11) Einar Lea: Mortalité dans le stock du hareng adulte de Norvège.
12) K. A. Andersson: Fluctuations de l'abondance du hareng dans la Baltique et dans le Sund.
13) G. P. Farran: Fluctuations dans le stock du hareng au Nord de la côte de Donegal.
14) W. C. Hodgson: Fluctuations du hareng.
15) H. Lissner: Fluctuations de la pêcherie du hareng au chalut en Allemagne.
16) J. J. Tesch: Investigations sur les classes annuelles du hareng dans le Sud de la Mer du Nord.
17) Jean Le Gall: Statistiques biologiques et considérations sur la population harenguière de la Manche Orientale.

18) Paul Bjerkan: Fluctuations in the Stock of Young Sprat on the West Coast of Norway and its Relation to the Sprat Population as a whole.
19) T. H. Järvi: On the Fluctuations in abundance exhibited by the stock of Coregonus albula in Lake Keitele, Finland.

The Chairman proposed, and the Meeting agreed, that the Council be asked to print these communications as soon as possible, and that next year's Scientific Meetings on a biological subject should be devoted to their discussion.

Current Measurements.

Held at the Offices of the Zoological Society on April 13th, 1929. at 10. a.m.
Chairman: Professor Witting.

At the beginning of the meeting Prof. Knudsen communicated:— Some observations from the "Dana" in the Pacific.

The following papers were read:—

1) R. Witting: Determination of Currents, direct and indirect.
2) A. Schumacher: Remarks on the Technique of Current Measurements.
3) J. N. Carruthers: Current Measurements, — Aims and Methods in the Study of Currents.
4) H. J. Buchanan-Wollaston: Results obtained with his Current-Meter.
5) Rafael de Buen: Direct and indirect Measurements of Currents.
6) E. Palmén: A Contribution to the Calculation of Currents in a Limited and Stratified Area.
7) J. P. Jacobsen: Determination of the Movement of the Water and the Intermixing of the Waterlayers in a vertical Direction.
8) St. E. Stenij: On the Connection between the Periodical Sea Currents and the Variations of the Water Level.

The Chairman expressed the hope that the papers, which were read in abstract, should be published and that the Scientific Meetings should be continued. Owing to the lack of time no further discussion was undertaken.

18) Paul Bjerkan: Fluctuations du stock de jeunes esprots sur la côte ouest de Norvège et relations de ce stock avec la population générale de l'esprot.
19) T. H. Järvi: Sur les fluctuations d'abondance manifestées par le stock du Coregonus albula dans le lac Keitele, en Finlande.

Le Président propose — et la Réunion accepte — que l'on demande au Conseil d'imprimer ces communications le plus vite possible, et que les Réunions scientifiques de l'année prochaine portant sur des sujets biologiques soient consacrées à leur discussion.

Mesures de Courants.

La Réunion se tient dans les Bureaux de la Société Zoologique le 13 avril 1929 á 10^{h} a. m.
Président: le Professeur Witting.

Au début de la séance le Professeur Knudsen fait une communication sur: Quelques observations du "Dana" dans le Pacifique.

Les communications suivantes sont lues:—
1) R. Witting: Détermination de courants, directe et indirecte.
2) A. Schumacher: Remarques sur la technique des mesures de courants.
3) J. N. Carruthers: Mesures des courants, buts et méthodes dans l'étude des courants.
4) H. J. Buchanan-Wollaston: Résultats obtenus avec son "Current-Meter".
5) Rafael de Buen: Mesures directes et indirectes des courants.
6) E. Palmén: Contribution au calcul des courants dans une aire limitée et stratifiée.
7) J. P. Jacobsen: Détermination du mouvement de l'eau et du mélange des couches d'eau dans le sens vertical.
8) St. E. Stenij: Sur la connexion existant entre les courants marins périodiques et le niveau de l'eau.

Le Président exprime l'espoir que les travaux qui ont été lus en résumés seront publiés et que les Réunions scientifiques seront continuées. Par suite du manque de temps, aucune discussion n'a été entamée.

REPORT

of

ADMINISTRATION 1928—1929.

I. General.

Composition of the International Council for the Exploration of the Sea.

During the year 1928—29 no changes have occurred in the composition of the International Council.

Composition of the Bureau.

The members of the Bureau were the same as in the preceding year:— Mr. H. G. Maurice, President, Professor Johan Hjort, Professor Otto Pettersson, M. Théodore Tissier and Dr. C. Heinrici, Vice-Presidents.

Committees.

A list of the Committees will be found in the Procès-Verbaux of the last Council Meeting. All these Committees remain in being and continue their activities.

Audit of Accounts.

The Accounts of the Council for 1927—28, audited by a qualified accountant and examined and found correct by the Finance Committee, will be submitted to the Council for final approval.

A statement is given below of the Accounts for 1928—29 which have to be examined by the Finance Committee.

Statement of Accounts for the financial year 1928—1929.

Receipts:

			Estimates	Real Receipts
I.	1.	Balance brought forward from 1927—28	203 881.68	203 881.68[1])
II.	2.	Annual contributions of the Governments: for 1927—28	177 000.00	67 000.00
		- 1928—29		95 000.00
III.	3.	Interest on Bank deposit	4 000.00	4 785.02
IV.	4.	— - Treasury bonds	3 040.00	3 788.61
	5.	Profit on Bonds redeemed	2 530.98	2 530.98
V.	6.	Sale of publications	1 000.00	1 357.17
		Total Kr.	391 452.66	378 343.46

Expenditures:

			Estimates	Real Expenditures
I.	1—5.	Incidental expenses	16 000.00	16 000.00
II.	6—10.	Administrative Staff	40 700.00	40 604.07
III.	11.	Expenses of the office in Copenhagen	15 000.00	14 999.64
IV.	12.	Travelling expenses	13 000.00	15 302.92
V.	13.	Chairmen of Committees	29 000.00	28 500.00
VI.	14.	Special Resolutions of the Council	35 525.50	23 041.15
VII.	15.	Printing and distribution	57 000.00	60 003.32
VIII.	16.	Transferred to Pension Fund	3 040.00	3 788.61
		Total Kr.	209 265.50	202 239.71

Receipts	per 31/3 1929	Kr. 378 343.46
Expenditures	per 31/3 1929	- 202 239.71
Cash balance	per 31/3 1929	**Kr. 176 103.75**

Of this Balance there were deposited in Kjøbenhavns Handelsbank and cash	Kr. 107 985.70
Danish Treasury Bonds, nominal Kr. 70 000.00, deposited with the Ministry for Finances (Market value on March 31st, Kr. 67 375.00) Purchase value	- 68 118.05
	Kr. 176 103.75

[1]) + Russia's contribution for 1914/15, **Rbl. 14 430.54,** deposited in a Leningrad bank has not yet been recovered.

All Contributions for 1927—28 have been received. The following countries have not yet paid their Contributions for 1928—29: Great Britain, Finland, France, Italy, the Netherlands, and Latvia, and from Ireland is up till now only received half contribution.

Special reserve for pensions:

Danish Treasury Bonds, nominal Kr. 11.000, deposited in a box in the bank (Market value on March 31st 1929, Kr. 10 912.50).	
Purchase value	Kr. 10 748.34
Deposited in Kjøbenhavns Handelsbank	- 124.14
	Kr. 10 872.48

Meetings.

Meetings of the Bureau attended by all members were held in Copenhagen in June and in London in November 1928.

II. Work of the Bureau at Copenhagen.

Besides administrative work, correspondence, etc. the following work has been carried out:—

A. Publications.

Report regarding the publications issued and cost of same during the financial year 1928—29 per $^{31}/_{3}$ 1929.

Series	Volume and Subject	Author	No. of copies	Cost Kr.	Remarks
Rapports et Procès-Verbaux	XLVII. Jubilee Vol.		800	8 760.96	minor expenses included
—	XLVIII. Rep. of the Transition Area and Baltic Area Committees		800	2 635.00	
—	XLIX. Proc.-Verb.		800	3 780.85	
—	L. Whales and Whale Foetuses	S. Risting	800	2 489.37	
—	LI. La Pêche Littorale sur les Côtes de Belgique	G. Gilson	800	3 642.13	
—	LII. Rep. of the Moray Firth Committee		800	2 009.65	Kr. 4 030.35 paid in 1927—28
—	LIII. The Estimation of Phosphates and Nitrogenous Compounds in Sea Water		800	2 333.30	
—	LIV. Racial Investigations of Fish		800	4 124.75	
—	LV. Rapp. Atlantique		800	2 993.00	
		To carry forward...		32 769.01	

Series	Volume and Subject	Author	No. of copies	Cost Kr.	Remarks
		Brought forward...		32 769.01	
Occasional Reports	Quantitative Plankton Investigations carried out during the Expedition with the "Michael Sars", July-Sept. 1924	H. H. Gran	800	3 147.75	
—	Investigation of the Production of Plankton outside the Romsdalsfjord 1926—1927	H. H. Gran	800		
	Blocks for Hjort's Report			1 204.87	
—	Scientific Abstracts for use for extra Scientific meetings			867.75	
Bulletins	Bull. Hydrographique, 1927		800	2 913.00	
—	Bull. Trimestriel 1928, Nr. 1		200	688.75	
—	Offprints of Bull. Hydr. for 1928 Oct., Novbr., Decbr.		50	460.00	
—	Offprint, Jan.		50	97.75	
—	Offprint, Febr.		50	114.50	
—	Bulletin Statistique		800	1 224.00	
Journal du Conseil	Vol. III, No. 2		750	3 475.10	Cost includes fees to contributors, translations, blocks, etc.
	Vol. III, No. 3		750	3 038.50	
	Vol. IV, No. 1		750	3 486.60	
			Total...	53 487.58	
	÷ paid on account at the end of last year			4 000.00	
			Total...	49 487.58	
	Other costs of Publications:—				
	Distribution			4 379.29	
	Translations, drawings etc.....			6 136.45	
			Grand Total...	60 003.32	

B. Hydrographic Department.

For an account of the activities of the Service Hydrographique before the 15th of September reference may be made in part to the account given in Rapp. et Proc. Verb. Vol. XLIX p. 119. The rest of the work consisted of the distribution of the Bulletin trimestriel 1928, No. 1, the preparation of manuscript and proof prints of the Bulletin Hydrographique 1927, and the plotting of observations in the Atlantic for the month of May 1928.

For the time after the 15th of September the following statements may be made regarding the activities of the Department.

a) Preparation of manuscript and proof-prints of the Bulletin Hydrographique 1928.

It has, as a rule, been possible to have the hydrographic material which is received before the 10th of a month, printed as proofs in the same month and to have the proofs sent out about the last day of the month.

Not all the hydrographic material for the year 1928 has as yet been received, but it is hoped that it will all be at hand in the course of the month of April. It is to be expected that the Bulletin for 1928 will be somewhat more extensive (about 30 per cent.) than that of 1927 on account of the increasing amount of material received.

b) Provisional charts showing decade surface-salinity-normals have been constructed for the North Sea on the basis of the charts from "Deutsche Seewarte" (1927) and from G. Böhnecke 1922. Normals of this kind have hitherto been totally lacking and are considered necessary, *inter alia* for the inspection and criticism of fresh salinity material received from the North Sea. They may also be of use in the work mentioned under c.

c) As an experiment, charts showing the anomalies of temperature and salinity in the North Sea have been constructed based on the provisional charts mentioned under b) and a part of the material received. The charts showing the anomalies of *t.* and *S.* have been copied in longhand and sent out to the members of the Sub-committee appointed in Stockholm in May 1927 and to Prof. R. Witting in order to get their opinion as to the value of this method for the dissemination of material received by the Service Hydrographique.

d) As an experiment a graphical representation of *t.* and *S.* of some material from Norway and Scotland has been worked out. Copies of the drawings have been sent to Mr. Sund and Dr. Bowman.

e) Preparation of lists of salinity observations as the first step in the calculations of salinity normals for decades and squares in the North Sea has been commenced and so much of the work has been carried out that it can form a basis for the discussion of the further steps to be taken.

f) The Service Hydrographique has assisted in the preparation of the following publications:—

1) Rapp. & Proc. Verb. Vol. LIII. The Estimation of Phosphates and Nitrogen Compounds in Sea-water.
2) Rapport Atlantique 1927.
3) The paper of Dr. E. Martens contained in the report on Whales and Plankton in the North Atlantic by Johan Hjort.

C. Statistical Department.

The Bulletin Statistique for the year 1926 was published at the end of the year 1928 and the work on the Bulletin for 1927 has been carried on during the year 1928—29, but as the material from Belgium has not yet been received at the Bureau the Bulletin Statistique for the year in question will not be published before the autumn of 1929.

Reports of the Area Committees.

NORTH-EASTERN AREA
1928.

By

Oscar Sund.

Norway.

Cruises.

The Directorate of Fisheries carried on investigations by means of four ships, the permanent fishery research cutter "Johan Hjort" and the hired vessels, fishing steamer "Kirkholmen" and the motor cutters "Arnulf" and "Havdrøn".

1) The "Johan Hjort" was in commission from the end of February to the middle of October and from the end of November to the end of December and the work was limited to the physical and chemical oceanography and plankton of the coast between Bergen and East Finmark and the coastal waters out to about 60 miles from land. During March and April the coast between Bergen and Lofoten was investigated with special regard to the Lofoten area in continuation of the work done in the same area since 1922.

Among the more interesting results may be mentioned that the nitrate and phosphate content of the surface layers was found to be rich (resp. about 100 and 40 mg. pr. cub.metre) up to the beginning of April when the nitrate content was nearly used up in the course of 8—10 days and the quantity of phosphate was about halved. At the same time the spring growth of diatomeans took place. This was, however, not very prolific compared with that of several other years.

The month of May was devoted to a renewed survey of the coast from Lofoten to Bergen and from Lofoten to Finmark where research was carried on mostly as sections from the coasts of Finmark and the Fisherman's Peninsula out to sea so as to cover an important portion of the fishing grounds. The fishing was very poor along the Norwegian coast, better farther east where the bottom temperature was below 2° while a bank of very salt and comparatively warm water (above 3°) extended all along the Finmark coast. — In July a renewed survey was made of the coastal waters and fjords from Finmark to Lofoten. In August a cruise was made over the North Sea from Bergen to Orkney, to the Faroe-Shetland Channel and back to Bergen. In September—October the fjords and coastal waters between Stavanger and Trondhjem were the object of

a rapid survey. In November—December a rapid survey of the coastal waters was made from Bergen to Tromsø. It is hoped to make this late autumn cruise a regular annual feature.

The year's work of the "Johan Hjort" comprises 374 observation stations, including about 3,660 observations of temperature and salinity, 665 of oxygen and 1,740 of nitrate and as many of phosphate. Selected portions of the observational material is being published in the Council's Bulletin Hydrographique.

2) The s.s. "Kirkholmen" was employed, under the leadership of Mr. Thor Iversen, from the middle of July till the end of October, on a combined fishing research and oceanographical expedition to the Bear Island and Spitsberg waters. A great deal of work was expended on providing accurate soundings on the badly charted banks around Bear Island. Oceanographical observations, comprising well over 500 observations of temperature and salinity were made at 57 points. The fish caught were measured and the stomach contents determined. A restricted number of cod and young halibut were marked.

3) The m.c. "Arnulf" was employed by Mr. Einar Lea during and after the herring spawning season in March—April. Observations were made on the manner of deposition of the herring eggs and on the mortality during hatching. At the same time experiments were made with two types of the Pycnosonde constructed by Dr. D. la Cour for the purpose of a swift orientation concerning the hydrographical properties of the sea.

4) The m.c. "Havdrøn" was employed in the N.E. Area by Mr. Paul Bjerkan, during the month of June and from July 12th to 17th, the intervening time being used for investigations in the Transition Area, especially the Oslofjord. During this time stations with temperature and salinity observations were taken at 61 points from the innermost part of Nordfjord in the north to the fjords west of the Naze in the south, mostly only down to a depth of 150 m. Plankton hauls were taken at each station, mostly vertical hauls with closing nets, stepwise. In the upper 50 m.s layer copepod plankton was unusually scarce, and phytoplankton dominated in those layers during June in all the outer fjords, denoting that the "summer in the sea" was very much retarded there. This was also shown by the temperature and salinity observations which seem to indicate that the usual transition currents between the inner and outer parts of the fjords had been partly suspended, thus causing the effect of the continental heating to be withheld in the inner fjords. This was most certainly brought about by the extraordinary dry and cold weather during May and the first part of June.

Professor Hjort organised and directed a systematic investigation of the biological and oceanographical conditions on the coast of the Möre district and in the adjoining part of the Norwegian Sea as he did in the three preceding years.

The work at sea comprised five cruises, each of 2 to 3 days duration, beginning on the following dates: March 13th and 26th, July 27th, August 14th and 21st. The first four cruises were made in the vessel attached to Prof. Hjort's field-laboratory at Aukra (Möre), the "Morild" and extended from the head of the Romsdal fjord and out to sea beyond the continental shelf ("Storeggen"), about 45 miles in a N.W. direction from the Bjørnsund lighthouse at the mouth of the fjord. The fifth cruise was made in

a whaler and extended straight across the Gulf stream to a distance of 180 miles from the shore. The observations and material collected referred to the following elements: temperature, salinity, oxygen, hydrogen ion concentration, zooplankton, phytoplankton (water samples), assimilable quantity of nitrates and phosphates (the SCHREIBER method) and number of bacteria.

The phytoplankton samples from the two spring cruises were examined by Prof. H. H. GRAN and those from the summer cruises by Mrs. RUUD-FØYN who also carried out the SCHREIBER investigations. The bacteriological work was done by Mr. BRAARUD with the object of ascertaining the bathymetrical variation of the number of bacteria per unit volume of water. The countings were made on algal gelatine which proved to be the best substrate. Isolation was also made in order to identify the commoner groups of bacteria obtained in this manner.

Of the zooplankton-material the copepods are worked up by Mr. JOHAN RUUD.

As in previous years observations on whales and their food were collected at the whaling station at Aukra by Mr. RUUD who also several times found an opportunity to go to sea in the whaleboats of the station and utilise the opportunity of observations afforded in this way.

The results of the investigations have been published by HJORT and RUUD in Rapp. et Proc. Verb. Vol. LVI.

The Geophysical Institute of Bergen organised several cruises with the m.c. "Armauer Hansen". In June the "Armauer Hansen" was used to execute an oceanographical section from the mouth of the Sogne Fjord to a point N.E. of the Faroes. In July—August a current measurement expedition conducted by Professor HELLAND-HANSEN (Director of the Institute) and Professor WALFRID EKMAN of Lund, to the waters west of the Scottish Islands. The extraordinarily bad weather prevented any extensive series of measurements, but valuable experience was gained to be utilised on a new expedition to the waters west of Spain and Morocco in the summer of 1929. The "Armauer Hansen" has throughout the year made regular observations of the oceanographical conditions of the more important West Country fjords.

Biological Work.

Plankton. The microplankton water samples collected during the cruises of the "Johan Hjort" have been studied at the Botanical Laboratory of the University of Oslo by Professor H. H. GRAN and his collaborators.

Herring. Mr. EINAR LEA submits the following account on the herring work:—

The biostatistical investigations which have been carried on through a series of years, were continued in a manner similar to that employed in the years next preceeding except that a very rich fishery of small-sized fat herring in Northern Norway occasioned a more extensive collection of material than originally planned.

Besides these investigations the following new lines of research have been entered upon:— 1) the study of similarities or differences in the biometrical characteristics in the young herring occurring practically along the whole of the Norwegian coast, 2) year-class variation of the biometrical features in adult herring found spawning off the West

Coast, and 3) the admixture of "foreign" (not Norwegian) herring in catches obtained during the spawning season (spring) as well as at other seasons. Results already achieved have shown that all three lines of study are justified. It has been found that samples of young herring from the S. E. Coast are distinctly not-Norwegian, further that unquestionable year-class differences obtain among the spawning herring, and finally, that admixture of "foreign" elements can be traced in shoals of spawning fish.

The preliminary conclusion is that the line of study which has been followed in the Norwegian work on the herring where scale analysis has been the main consideration, may with great advantage be supplemented with biometrical observations and that a rational combination of these two sets of observations should make it possible to attain greater insight into the whereabouts of the different herring tribes, especially in such cases when individuals from several tribes are found together.

As a preliminary to such investigations a study was made in the summer of 1928, in a West Country fjord, of the so-called Pycnosonde, invented by the Director Dr. La Cour (of Copenhagen). The Pycnosonde is technically a highly interesting instrument which makes it possible to get a very rapid orientation in the hydrographical circumstances. The purpose of the work was to study the behaviour of the instrument and to find out whether it could be adapted to studying sudden variations in the level occupied by the herring in relation to hydrodynamical phenomena.

Sprat. Mr. Paul Bjerkan submits the following account of the sprat biology research work conducted by the Norwegian Directorate of Fisheries:—

Collection of samples to illustrate the variations of the stock were continued in 1928 as in former years, in all 65 samples. Of these 28 turned out to consist entirely of the 1928 brood. The cannery samples show the one year-olds predominating, as usual in later years except 1926 when older fish constituted the bulk to the north of the Hardanger fjord.

In other points the sprat fishery during 1928 displayed very extraordinary features. In the spring a sprat fishery took place in the inner parts of the great fjords (Hardanger, Sogn, Nordfjord) otherwise accustomed to autumn fishery only, while there was no fishing activity in early summer in the predominant sprat districts along the coast from Bergen to Stavanger although the 1927 brood was observed there both in April and in the preceding autumn. In August—September quite a good sprat-fishery took place in the Trondhjemsfjord, where usually only insignificant catches of sprats used to be had and then only from mixed shoals. The conditions displayed a weak stock, which seem to have been dispersed all along the coast north to Trondhjemsfjord and at the west coast even into the innermost fjords. In addition to the effect of the weak stock on the fishery we have the contrary hydrographical and biological conditions as shown during the cruise with "Havdrøn". These conditions seem to have forced the sprat to take to deep water earlier than usual, the combined circumstances thus bringing about a bad fishing season as the inevitable result. It was noteworthy that many catches were admixed with herring in all districts, and that the growth and quality were more variable than hitherto observed. The analysis of the young fish samples corroborated the conclusion arrived at earlier that young sprat caught along with herring fry are of greater size than those caught

unmixed, presumably because the earlier spawned sprat get more occasion to join the young herring shoals. The size of the fry was found to increase until October when growth ceased and the relative weight began to decrease.

Vertebral counts on the 1928 fry from the West Coast gave 48.7, much in excess of the 1927 brood (48.0). Such a high vertebral number was also found in the fry from the Arendal area (S.E. Coast). It thus appears to be necessary to keep the different year broods apart in biometrical studies of the sprat if pure results are to be obtained.

Cod. Mr. Oscar Sund submits the following account of the investigations conducted by the Norwegian Directorate of Fisheries:—

The investigations into the condition of the stock were conducted on similar lines to those followed in recent years, the main consideration being to obtain an extensive material of length measurements. The number of fish measured in 1928 was 76,000 as against 74,000 in 1927 and 64,000 in 1926. The number of scale samples taken has been greatly restricted in recent years in regard of the uncertainty attending the examination of cod scales, a circumstance necessitating such a vast number of determinations if trustworthy results are to be hoped for, that work and expense have been considered more profitably spent on acquiring a good measurement material. This has been found to yield very satisfactory results without suspicion of personal bias with regard to the renewal of the stock. The method applied in the analysis of the measurements is the object of a paper to be read at the scientific meeting.

The study of the cod eggs from the net hauls has revealed that a very high percentage of eggs in earlier stages of development contain deformed embryos. A paper by Mr. G. Rollefsen, who made this discovery, will be read at the scientific meeting.

A marking experiment was made from 5th to 22nd of March at Veidholmen in the Möre district. The number marked was 988 cod, 50 to 110 cm in length. The mark used was an ebonite plate fastened to the left gill cover with silver wire. Of these fish 256 or 26 per cent. were recaptured in 1928, a result which agrees very well with those obtained from the marking experiment carried out under the direction of Dr. Hjort at Lofoten in 1913 when the recapture percentage of fish liberated in March was even higher, up to 32 per cent. Several of the Möre fish were caught in late spring and summer in the fjords of Northern Norway, two had gone even as far as to Bear Island and East Finmark respectively. The bulk of the recaptures was, of course, made nearer, mainly in the area 30 miles to the South and 20 miles to the North of Veidholmen and within a month, the spring fishing being concluded in April. The apparent speed of the recaptured fish exceeded 5 miles per day only in 17 cases and in no case 7 miles.

Saithe and Haddock. Measurements and scale samples were collected on a restricted scale.

Finland.

The littoral vegetation was studied during 1928 on the shores of Petsamo by Dr. E. Häyrén.

A mareograph is under construction at Liinahammari on the Petsamo fjord.

Denmark.

Professor Johs. Schmidt has obtained a representative material of vertebral columns with unpaired fins of cod from the entire Norwegian coast for racial investigations. A preliminary account of the work done on material from 1927 was given at the last meeting of the Council.

Germany.

Cruises.

In 1928 no field work was performed in the N.E. Area but the extensive observational and plankton as well as other biological material has been worked up and will soon appear in the appropriate German publication (Memoirs by Schulz and Wulff in Vol. IV of Ber. d. Deutschen Wiss. Komm. f. Meeresf.). In the last report of this committee a general account of the expedition was given. The main particulars as to the nature of the investigations and the punctual manner in which the ambitious programme was carried through, will best be gathered from the sketch chart given p. 85.

A very interesting review by Professor Wulff, Heligoland, on the results of his investigations on the surface plankton from the expedition is printed as an appendix to this report. Special attention should be devoted to the chart attached to Professor Wulff's review.

Plaice Biology.

According to a communication from Professor Mielck, Heligoland, investigations on a limited scale are being made at Heligoland with the view of ascertaining the prospects of further work on Barents Sea material in the event of a later cruise of the "Poseidon" in those waters and to learn the differences between the northern plaice races. The material hitherto treated originates partly from the Barents Sea (collected by German trawlers), partly from Northern Norway (Bodø and Tromsø regions), in all about 250 individuals. The small recent sample agrees satisfactorily with a larger material from the Barents Sea collected by Heincke. In so far as conclusions may be drawn it may be stated that the Barents Sea plaice are characterised by high numbers of vertebrae and of anal and dorsal fin rays. It seems noteworthy that the corresponding figures gained from the Norwegian samples mentioned are much lower than in the Barents Sea plaice, not even coming quite up to the figures relating to plaice from the middle North Sea. Probably the Icelandic plaice also show lower figures than those from the Barents Sea, although not so markedly. In Professor Mielck's opinion these investigations will repay considerable extension.

Fish Measurements. Such will be undertaken from early in 1929 on Barents Sea fish landed at Wesermünde.

England.

Fish Measurements will be commenced in 1929 on Barents Sea fish landed in English ports.

Scotland.

Haddock scale samples have been collected from Barents Sea catches landed in Aberdeen.

APPENDIX

Barents Sea.

Plankton Investigations.

By

Alfred Wulff, Heligoland.

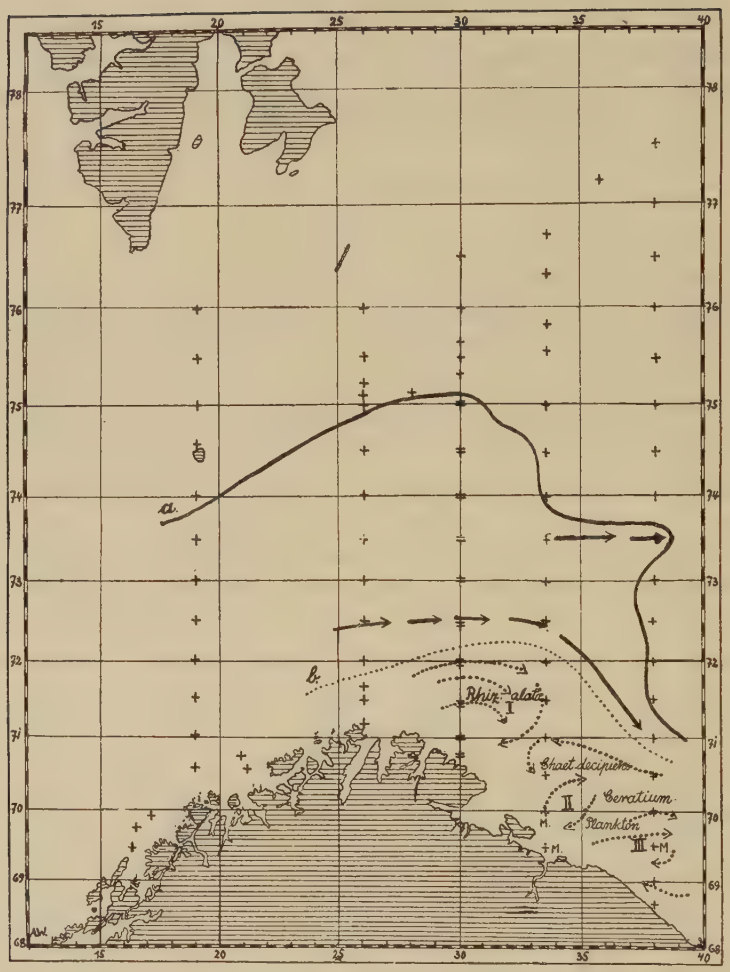
On the research cruises in the Barents Sea of the "Zieten", August—September 1926, and the "Poseidon", July-September 1927, the chief aim of which was the hydrographical survey of this sea, qualitative catches were made with the small surface net in close connexion with the hydrographical work at all the main hydrographical stations. Moreover, on the "Zieten" samples were examined for nanno-plankton as far as possible, whilst on the "Poseidon" for similar investigations of preserved material samples from the surface and in various sections also from deeper layers were poisoned with neutral formol.

The working-up of the "Zieten" material has been already published in No. 3 of Volume III[1]) of the "Berichte der Deutschen Wissenschaftlichen Kommission für Meeresforschung", the plankton obtained with nets on the cruise of the "Poseidon" being also worked up in the meantime; the results are at the present moment in the press. The aim of the investigations was to ascertain more precisely than had hitherto been possible the distribution of the organisms in the surface layers which can be caught with the small plankton net in the various categories of water which act and react upon each other in the Barents Sea. Both the cruises afforded a particularly good material for this, inasmuch as the stations, distributed over as wide an area as possible (in sections from the Norwegian and Russian coasts northwards as far as the line of drift ice), followed each other in as short intervals of time and space as possible (30 minutes of latitude between each). Altogether the plankton was examined from the following stations: 1926: on the northern coast of Norway 6, on the two sections (meridian $33^1/_2°$ and 38° E. Long.) 25, and at Kanin 7 stations; 1927: on the north-west coast of Norway 5, on the 6 sections (19°, 26°, 30° twice, $33^1/_2°$, and 38° E. Long.) 86 stations. The total was thus 38 + 91 = 129 stations.

As the catches were not suitable for a quantitative analysis, the frequency of the predominating plankton forms or of those which were typical for each area were ascertained by careful examination and comparative estimates, the relations of the different stations to each other in this respect being traced. Clear pictures of the distribution of a large number of plankton forms were obtained which are discussed one by one in the paper and which in their totality reveal plankton communities which belong to definite areas with uniform water supply.

Especial attention was devoted to the formation of the shells of the tintinnen species *favella* Jørg. (*cyttaroculis* fol.) which occurs frequently almost everywhere in

[1]) B. Schulz and A. Wulff: Hydrographische und planktologische Ergebnisse der Fahrt des Fischereischutzbootes "Zieten" in das Barentsmeer im August—September 1926.



Explanation of signs:—

\+ Stations of the "Poseidon" Aug.—Sept. 1927. (Section on 30° E executed twice).

a—— Line connecting places where *Favella denticulata* had the longest shell (700—800 μ), as well as N and E limit of Atlantic water, also S limit melting-ice water and W limit of "eastwater".

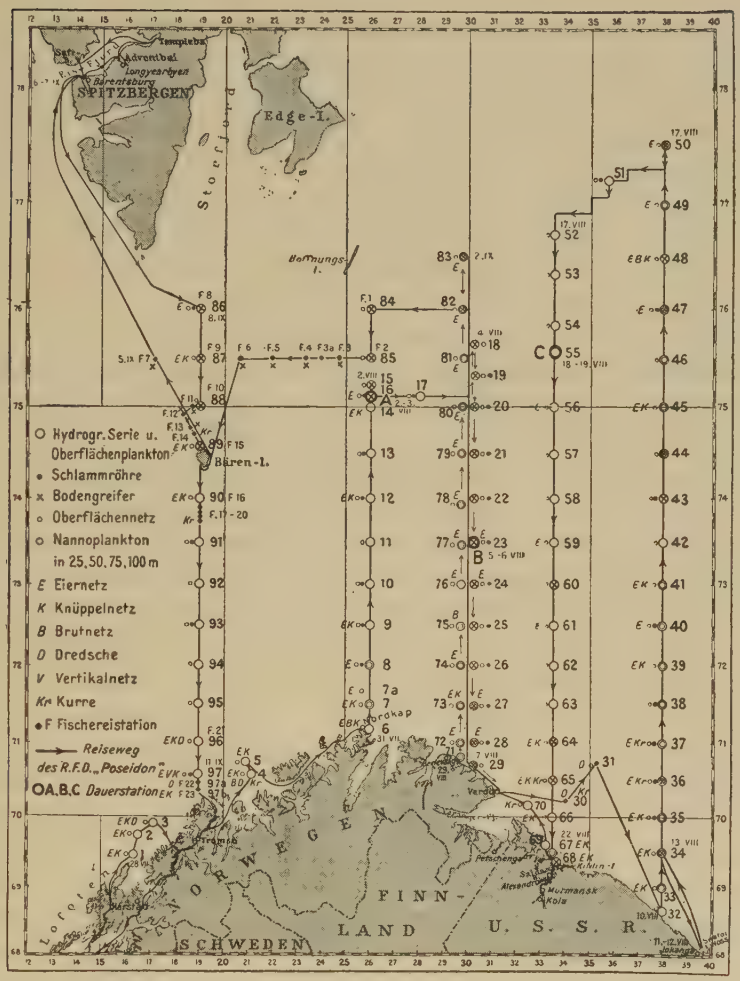
b..... Limit of coastal water towards the North Cape — Murman current.

→ Arrows denote course of 1st branch of Atlantic Stream (Murman current) and of the 3rd branch (farther N).

I, II, III, The three whorls in the coastal water.

M Stations with abundance of empty *Microsetella* skins.

the Barents Sea. Very numerous measurements and outline pictures drawn with uniform magnification enabled length curves to be plotted for each section, after the entire material had been worked up, and afforded a survey of the multifarious formation of the shells in each group of forms of this species. Thereby a survey was also afforded of how the group of forms are distributed in the various categories of water in the Barents Sea.



Course of the German Research Vessel "Poseidon" July—September 1927.

Some of the results of the investigations which have been developed in greater detail in the two works — especially in the second — may be briefly summarized as follows:—

The four components which supply the Barents Sea with water have each their own special plankton types from whose range and intensity of distribution can be deduced the limits of these water categories.

In the appended sketch map the clearly marked limit of the coastal water stretching in front of the northern Norwegian and Murman coasts is shown by the dotted line *b* coinciding with the 34.6 $^0/_{00}$ isohaline; typical forms of the coastal plankton are not found to any extent beyond this line, e. g. neritic diatoms, especially *Chaetoceras contortum*, *thalassiosira*, *coscinosira*, *Leptocylindrus danicus*, *Nitzschia seriata*, cladoceren, rotatorien, larval stages of benthos animals etc. Taken in detail, definite sub-areas were clearly perceptible in the more eastern portion of the coastal water, which are no doubt

to be regarded hydrographically as whorl areas: *Rhizosolenia alata* appears to be characteristic for the first whorl (see Fig.); the branch current of water coming from the east, encountered on the south-eastern side of the whorl, was characterized by an outburst of *Chaetoceras decipiens*, whilst the second and third whorls showed fairly uniform *ceratium* plankton with conspicuous accumulations of empty *microsetella* skins. It may further be mentioned here that these sub-areas were also each characterized by the predominance of shells, all of the same kind, of *Favella denticulata* forma *typica*; the larger shells may be regarded as endemic in the coastal water proper, and the shorter more compact ones as characteristic features for water flowing in from the east.

The water found to the north of the dotted line *b* showed in its plankton clearly marked features of Atlantic water flowing in from the west. In correspondence with the considerable breadth of its inflow in the more western portion of the area (meridian 26°, 30°, and 33½° E. Long.), the distribution of the typical plankton forms — e. g. *Chaetoceras criophilum* forma *volans* — extends horizontally for a great distance, i. e. northwards as far as the melting-ice water area (see below) stretching in front of the drift-ice; in the east it does not for the most part reach the meridian 38° E. Long., the 1st and 3rd branches of the Atlantic Stream, which were also both very clearly marked hydrographically, forming here an exception. For the southern edge of the current coming in contact with the coastal water *Rhizosolenia styliformis*, *Favella edentata*, etc. were typical, and for the Murman current especially *Chaetoceras boreale* and *Favella edentata*.

With the southern limit of the northern melting-ice water, sharply characterized hydrographically by the accumulating of the isohalines, coincides the southern limit of the plankton peculiar to it; in general it was not rich in forms and individuals except for some diatom outbursts of a more local nature; for the most part the tintinnen were by far the most numerous, i. e. a peculiar group of forms of *Favella denticulata*, which resembles to some extent the already well-known var. *cylindrica* but produces here an abundance of new shell forms which hitherto unknown are presented in detail and analyzed in the paper.

Dinobryon pellucidum forms in the north-eastern portion of the melting-ice water area the transition to the remaining water component of the Barents Sea, the "east-water". Its influence is perceptible along the greater part of the meridian 38° E. Long., but its main region of distribution lies to the east of the area under investigation so that its typical plankton composition was not clearly ascertained. *Ceratium arcticum* in the most typical forms, *Dinobryon pellucidum*, certain variations of *Ptychocylis obtusa*, *Leprotintinnus pellucidus*, and comparatively coarse and thick-walled shells of *Favella denticulata* var. *gigantea* and var. *elegans* may in general be regarded as representatives of it.

If a boundary line is to be given which towards the north and east divides the plankton of the Atlantic inflowing water from that of the melting-ice water and "east-water", we shall do best to choose the line (Line *a* in the Figure) connecting those stations at which occurred the longest shells (700—800 μ long) of *Favella denticulata* (var. *gigantea* and var. *elongata*).

We cannot here discuss more closely the investigations carried out in greater detail of the distribution of the forms and lengths of the shells of *Cyttarocylis denticulata*

in the area under investigation: the results were also brought into relationship with the hydrographical results, whereby parallels could be shown to exist for the most part even with respect to details. Most striking of all is the extraordinarily regular increase in the length of shells at the stations of the meridian sections from the coast northwards as far as the border line of the melting-ice water, or to the (western) "eastwater" limit in the east, so that the peaks of the corresponding length curves are found at the stations which in the north and east were situated on the border line of the influence of the Atlantic water perceptible on the surface of the sea. For numerous details the paper must be referred to.

Finally may be mentioned the most striking fact that the surface plankton at the stations of the western section (on meridian 19° E. Long.) from the Norwegian coast northwards up to 73° N. Lat. was found to possess scarcely any organisms of the Atlantic water from the deep waters of the Norwegian Sea (which predominated to the east of the latter in the Barents Sea) but that on the other hand its composition distinctly revealed a connexion with the plankton of the inshore region along the north-western coast of Norway. (*Favella serrata*, *Ptychocylis urnula* with pointed shell, *Ceratium macroceras*, *bucephalum* etc.). Parallel with this is the hydrographical discovery that throughout the entire extent of the section above the submerged Atlantic current there was a comparatively thick top layer with a remarkably low salinity.

NORTH WESTERN AREA
1928.

By

JOHS. SCHMIDT.

The following work has been carried out by the various countries:—

England.

No work has been carried out in 1928.

France.

No report has been received.

Germany.

No work has been carried out in 1928.

Norway.

1) Hydrography. A section from the Shetlands to the Faroes was made on August 21st during the cruise of M/C "Johan Hjort" from Bergen to the Orkneys and the Shetlands (data printed in the Bulletin Hydrographique).
2) Biology. Samples of Herring collected in North Iceland for comparison with those from Norway and Iceland with special regard to the points of view set forth by Dr. A. C. JOHANSEN (cf. what has been stated as to the Shetland-herring in the report from the northern North-Sea, Vol. XLI, p. 64).

Scotland.

1) General Statistics from Iceland from the Faroes for 1928.
2) Haddock measurements and scales from Faroe and Iceland commercial catches landed at Aberdeen Market.
3) During August 1928 a co-operative hydrographical survey of the boundary area between the Wyville-Thomson Ridge and the Butt of Lewis and St. Kilda was carried out by H.M.S. "Flinders" and the Scottish Research Vessel "Explorer". The survey included observations of temperature and salinity, determinations of hydrogen-ion concentration and oxygen content, and estimations of the phosphate and nitrate content at all depths from surface to bottom at numerous stations.

Denmark.

Trawling inside and outside the territorial limit in Faxe Bay. In 1928, the research vessel "Dana" was not employed in these investigations in Faxe Bay. The investigations were therefore, and also in order to procure material from all seasons, as agreed with the Icelandic Government, carried out by the Icelandic Inspection vessel "Thor". Operations were conducted from the "Thor" by Fiskerikonsulent Bjarni Sæmundsson.

Trawling was carried out both inside and outside the territorial limit (20 hours each) in February, May, August and October, the dates being February 22nd—25th, May 4th—6th, August 5th—7th and October 11th—16th, 1928. The results were on the whole in agreement with those of the "Dana" trawlings, but there seems to be some alteration in the size and composition of the stock of fish during the course of the seasons. These trawling experiments will be continued for some time further in order to procure a sufficient amount of material from which to judge of the position.

Collection of material for investigation of fluctuations in the stock of cod in Icelandic waters. The material was collected in a manner similar to that employed by Oscar Sund in Norway. Operations were conducted by magister Å. V. Tåning in April—July at four localities: Vestmanø, Isafjord, Siglufjord and Nordfjord. The material comprised, firstly measurements of about 20,000 cod (about 3000, 4000, 7000 and 6000 from the four localities mentioned) and further, scale- and otolith samples from a suitable number of the cod landed in the respective fishing ports.

A preliminary analysis shows the following dominant year-classes:—

Vestmanø: Year-classes 1917 and 1919, the latter especially; all the fish on this ground were spawning fish.

Isafjord: The 1922 year-class.

Siglufjord: The 1922 year-class, amounting to close on 50 per cent. of fish landed.

Nordfjord: Year-classes 1922 and 1924, showing that the fishery on the East Coast takes mainly the youngest year-classes.

These investigations are still in their initial stage, and the full results will not be apparent until after the work of collection has been carried on for, say, 3 years.

Marking of Cod in Iceland waters etc. During May—July, about 700 cod from Isafjord, Siglufjord and Nordfjord were marked, representing the stock fished in these localities. Information regarding recaptures was procured in Iceland by the "Fiskifjólag Islands" and communicated to the Danish Commission for Fishery and Marine Investigations.

Markings of cod were also made, by arrangement, both in East and West Greenland (from Angmagsalik by the Manager of the Colony, and on the West Greenland banks from the Inspection vessel "Godthaab").

Investigations as to Migrations of the Herring in relation to its Food. These investigations were continued in 1928 from Siglufjord, where material was collected by stud. mag. P. Hammer, under the supervision of Professor C. H. Ostenfeld.

Investigations as to the course of the currents round Iceland. In

order to ascertain the course of the surface current, etc. on the coastal banks about 300 ordinary surface drift bottles were set out in April—June 1928, at the following localities: Off Portland, south of Reykjanæs, off Sneefellsnæs, off Látrabjerg, off Cape Nord, off Skagi, N.W. of Siglunæs and off the Horn on the East Coast. Up to December 31st, 1928, 13 per cent. of the bottles had been recorded as returned; several of these afford considerable fresh information as to the course of the currents round Iceland. Many of the bottles had drifted from 60 to 180 miles before being recovered; two passed out of the Icelandic waters, one to the Faroes and one to the northern Norway; the direction in Icelandic waters, in all cases where any great distance had been covered, was anticyclonically round the coast.

Continuous hydrographical investigations in Faxe Bay. In order to ascertain as far as possible the fluctuations of temperature and salinity in Faxe Bay, a series of observations was taken throughout the course of the year from two points in the Bay, the work being carried out by the inspection vessels. These investigations are to be prosecuted for a considerable number of years, and were carried out in 1928 as previously.

Collection of material for investigating the fluctuations in the stock of cod at the Faroes. These investigations were continued in 1928 in the same manner as in 1927, by men entrusted with the task at several places on the islands; the material procured in 1928 comprises about 6000 measurements of cod, with suitable samples of scales and otoliths. As with the corresponding material from Iceland, the final results will not be available until after material has been collected for several years.

Continuous hydrographical investigations at the Faroes. As in the case of the continuous hydrographical stations in Iceland waters (Faxe Bay), observations were made at the Faroes from three localities, as far as possible throughout the whole year; these observations were made in 1928, as previously, by the inspection vessel "Beskytteren".

The following publications have been issued:—

Harold Thompson: General Features in the Biology of the Haddock (*Gadus æglefinus* L.) in the Icelandic Waters in the period 1903—1926.

R. Spärck: Preliminary Survey of the results of the Quantitative Bottom Investigations at Iceland and the Faroes in 1926—1927.

Arni Fridriksson: Age-Composition of the Stock of Cod in the East-Icelandic Fjords during the years 1925—1927.

Å. V. Tåning: Plaice Investigations in Icelandic Waters.

Bjarni Sæmundsson: On the Age and the Growth of the Coalfish (*Gadus virens* L.), the Norway Pout (*Gadus Esmarki* Nilsson) and the Poutassou (*Gadus poutassou* Risso) in Icelandic Water.

In Preparation: A Survey of the Results of Markings of 1200 Cod at the Faroes in 1923.

PLATEAU CONTINENTAL ATLANTIQUE

1928.

(Atlantic Slope).

Par

Ed. le Danois.

Le programme des études entreprises ayant subi quelques modifications, je me permets, conformément à l'usage, de le retracer dans son ensemble.

1) En vue de continuer l'étude des conditions hydrographiques et biologiques du Golfe de Gascogne, des croisières périodiques trimestrielles seront effectuées par les gouvernements de la France, de l'Espagne et de l'Etat Libre d'Irlande, dans les conditions suivantes:

Espagne:	8° W. G. de la côte jusqu'au 47° N.
	47° N. entre 8° W. G. et 9° W. G.
	9° W. G. du 47° N. à la côte d'Espagne.
France:	d'Ouessant au 9° W. G. (49° N.).
	9° W. G. du 49° N. au 47° N.
	du 47° N. (9° W.) à Ouessant.
Irlande:	8° W. G. de la côte au 49° N.
	49° N. entre 8° et 9° W. G.
	9° W. G. du 49° N. à la côte d'Irlande.

Ces croisières seront effectuées aux mois de Février, Mai, Août et Novembre.

A chaque sortie, une ou plusieurs stations comprendront des observations en eau profonde; si possible de la surface au fond, en dehors du Plateau continental. Les sorties seront utilisées pour des pêches planctoniques à l'aide du filet vertical.

2) L'étude de la Manche Occidentale sera faite par les soins du Gouvernement de Grande-Bretagne sous forme de croisières périodiques, exécutées par le navire de la "Marine Biological Association".

3) L'Etat Libre d'Irlande exécutera des croisières au Sud-Ouest de cette île afin de préciser la position de la ligne iso-haline 35.5 $^0/_{00}$.

4) Les études du Comité s'étendent au Sud dans les régions de Madère, des Açores, des îles du Cap Verd et des Canaries, en relation avec le nouveau laboratoire espagnol de ces dernières îles.

5) Le Portugal et l'Espagne feront un accord pour une étude combinée en baie d'Espagne. MM. Rafaël de Buen et Ramalho sont désignés par le Comité pour cet accord.

6) Les recherches dans le détroit de Gibraltar seront effectuées en accord avec celles de la Méditerranée.

7a) Les études sur le thon rouge, et le germon seront continuées sous leur forme actuelle.

b) Les études sur la sardine porteront principalement sur la différenciation des races locales et les dates et lieux de ponte, en se basant non seulement sur l'état sexuel des poissons, mais aussi sur les récoltes planctoniques d'œufs et de larves.

c) Les études sur le merlu seront continuées sous leur forme actuelle; de plus pour l'année 1928 il est prévu: une croisière du navire "George Bligh" au mois d'Août et une croisière du navire "Tanche" au mois de Juillet. La croisière du "George Bligh" permettra des observations sur la dimension des mailles des chaluts. Des mesures de jeunes merlus seront effectuées sur les marchés de Fleetwood et de Milford.

8) L'étude des races de hareng sera continuée en Manche Occidentale et dans la région Sud-Ouest des Iles Britanniques.

9) La méthode des statistiques biologiques sera appliquée dans une très large mesure à toute question étudiée par le Comité.

10) Des études planctoniques seront effectuées au cours des diverses sorties en vue de recueillir des renseignements sur le plancton servant de nourriture aux cétacés.

11) Il sera organisé un service d'informations rapides entre les membres du Comité après chaque sortie des navires. Des listes provisoires avec les températures, et définitives avec les salinités seront adressées par chaque membre du Comité à ses collègues aussitôt que les renseignements en question seront en sa possession.

12) Le Prof. Odón de Buen est prié de bien vouloir fournir un plan d'organisation d'un service d'observations régulières faites à partir des laboratoires côtiers. Ce mémoire sera communiqué aux membres du Comité qui devront faire parvenir au Président leurs observations à ce sujet avant la prochaine réunion du Comité.

13) Le Comité du Plateau Continental émet le vœu que des fiches faunistiques, analogues à celles publiées par la Commission Internationale de la Méditerranée, soient éditées par le Conseil International, comprenant les espèces animales du Secteur Atlantique, et principalement les poissons. La publication de ces fiches sera faite à Paris, sous la direction de M. le Professeur Joubin.

14) Les sorties périodiques des navires espagnols, français, irlandais et portugais seront annoncées aux différents membres du Comité télégraphiquement en vue de permettre une coincidence exacte de ces sorties.

En ce qui concerne les croisières le tableau ci-contre indique par mois et par pays les sorties effectuées par les navires de chaque nation dans le secteur du Plateau Continental Atlantique.

Il peut se résumer comme suit:

Angleterre: Sorties périodiques mensuelles du navire H. M. S. "Salpa".
Irlande: sorties du navire "Muirchu" en Avril, Mai, Août et Novembre.
France: sortie de la canonière de la Marine Nationale "Arras" en Mai.
Croisières des navires "Estafette" et "Sentinelle" de la Marine Nationale en Avril et Mai.

1928	Angleterre	France	Irlande	Espagne	Portugal	
Janvier.....	Salpa	....	....	....	....	....
Février	Salpa	....	....	Eduardo-Dato	....	Sortie périodique
Mars	Salpa	....	....	....	....	....
Avril	Salpa	Estafette Sentinelle	Muirchu	....	....	....
Mai	Salpa	Arras Estafette Sentinelle	Muirchu	....	Albacora	Sortie périodique
Juin.....	Salpa	....	....	Eduardo-Dato		....
Juillet.....	Salpa	Pétrel Tanche	....	....	Albacora	....
Août	Salpa	Tanche	Muirchu	Eduardo-Dato	....	Sortie périodique
Septembre	Salpa	....	....	....	....	....
Octobre.....	Salpa	....	....	....	....	....
Novembre.....	Salpa	....	Muirchu	....	....	Sortie périodique
Décembre.....	....	....	....	....	....	....

Croisière du chalutier "Tanche" en Juillet et Août.
Espagne: Sorties périodiques du navire "Eduardo-Dato" en Février, Juin et Avril.
Portugal: Sorties du navire "Albacora" en Mai-Juin et en Juillet.

Comme les années précédentes à chaque croisière combinée certains des états n'ont pas eu de navire disponible et l'exécution de ces sorties a été en somme assez irrégulière.

Les études techniques ont, par contre, été continuées avec activité dans le secteur, notamment en ce qui concerne le merlu et la sardine.

Comme modification dans la composition du Comité, je dois signaler que Monsieur le Professeur Bruno Schulz doit remplacer pendant l'année prochaine notre éminent collaborateur, le Docteur Schott, parti en voyage dans l'Océan Pacifique et dans l'Océan Indien, jusqu'ici représentant de l'Allemagne.

COMBINED NORTH SEA
1928.

By

David T. Jones.

The subjoined Reports of the Northern and Southern North Sea Committees show that during 1928 satisfactory progress has been made with the important and difficult investigations in hand. Contact has been maintained between the two Committees with a view to economy and efficiency of effort in the conduct of the investigations and the question of further co-ordination, if and where possible, is kept under constant observation.

NORTHERN NORTH SEA

By

Alexander Bowman.

During the year under review the investigations by the participating countries were focussed mainly on the herring and haddock, intensive studies being made of various aspects in the life-histories of these two species. Other species such as plaice, lemon sole, witch, tunny, skates and rays have also been the objects of investigation. On all cruises of the research vessels extensive hydrographic, plankton, and biological observations were also made.

The following is a resumé of the work carried out by the participating countries.

England.

The following measurements in the area have been made by fish measurers of the Ministry of Agriculture and Fisheries on commercial vessels.

Plaice	7,000
Cod	10,000
Haddock	140,000
Hake	7,000
Turbot	1,000
Total...	165,000

As in previous years all haddock measurements from the North Sea were placed at the disposal of the Fishery Board for Scotland.

France.

The Fishery Protection Vessels "Sentinelle" and "Estafette" have continued their usual oceanographic observations during the herring season (July to September 1928) in the northern part of the North Sea.

Observations have been made, as usual, on the herring fishing grounds, and have included meteorological, hydrographic and biological conditions as well as the fluctuations of the fishing.

Samples of herring have also been regularly taken during the fishing season and their study carried out according to the methods previously determined.

The presence of the tunny has again been noted on the herring fishing grounds during the summer of 1928. These large Scombrids have appeared this year very early in the North Sea (the first fortnight in July) and in relatively large numbers. The observations made as to their actual presence and indications found as to their presence earlier in the North Sea area will be the object of a special communication in the "Journal du Conseil".

Germany.

The work of the Department of Fishery Biology in Hamburg during 1928 was directed chiefly to the study of the herring and dealt in the widest sense both with the Natural History and the conditions of capture of this fish.

Exact statistics of the share taken by Germany in herring trawling were kept as formerly which established that the total catch of about 48 million kg. created a new record, that, however, $\frac{1}{5}$ million kg. of this total were landed at British ports, and that a considerable part of the catch was no longer obtained from the North Sea but from the waters to the west of Britain. An exhaustive account of the conditions was given by Dr. H. Lissner in the "Fischerbote" for the 2nd February 1929.

The course of the German drift-net fishing was followed with similar interest and indeed numerous log books were prepared which were filled up by the individual skippers and contained exact data as to the locality of capture and the yield of the fishing. Charts were also prepared showing the course and intensity of the herring fishing in the north-western North Sea which were published in the "Berichte der D.Wiss. Komm., Bd. III, 4", by Dr. H. Lissner, while additional similar material was collected for subsequent publication.

The chief object of the scientific investigations is directed to the composition of the shoals of the North Sea Bank Herring with reference to year classes, to the preponderance of certain years, to the degree of maturity and to the condition of nourishment, and to the relation between sexual maturity and growth so as to obtain conclusions therefrom as to the composition of the catch and the prospects for future fishing periods which has again been shown to be practicable this year.

In order to carry out this work numerous samples of herring were subjected to the required analysis. These samples were partly caught by the "Poseidon" on a cruise in the northern and middle North Sea from the 18th of August to the 5th of Sep-

tember under the direction of Prof. Ehrenbaum and partly by Dr. Lissner on a cruise with the Fishery Protection Vessel "Zieten" from the 8th to the 30th October 1928 in the southern North Sea. In addition, samples were used which were obtained from the market in Altona, and also a sample of this kind which was sent from Lowestoft by Mr. G. T. Atkinson. It appeared from the investigation of all these samples that in the case of the Bank Herring of the North Sea the year classes 1922 and 1924 played an important part, while for the Lowestoft herring the year class 1921 was outstanding in individual numbers.

The great majority of the herring samples analysed were also used for racial investigations and Dr. Schnakenbeck, who devotes himself particularly to this study, has in this way collected extensive material which will serve later to complete the reports already published on this subject (Berichte der D. W. K., Bd. III, 2).

It is expected that these racial investigations will be placed on a broader and more secure basis by means of researches on the conditions of growth of the herring in different years. These investigations are planned in agreement and co-operation with the Laboratory in Lowestoft (Mr. W. C. Hodgson) and at the instigation of Mr. Einar Lea, Bergen, on an extensive scale for the immediate future, and in this connection the determination of L. 1 in particular will be carried out by means of a very large number of scale measurements such as has already been attempted from another side.

For these investigations the material containing numerous young herring of the I- and II- groups which is regularly available from the winter fishing in the mouth of the Elbe was recently brought into use and some catches of similar herring from the Jade, which happened to be made on a cruise of the "Poseidon" in November 1928 will also be used in the same way.

The collecting of herring larvae of different ages has been continued at every available opportunity and in this way the material at our disposal has been substantially increased; these collections of larvae however still remain to be dealt with. It is also proposed in this connection to keep in view any change in the condition of different local forms and especially to note variations in the time of the formation of the fin rays, of the vertebrae, and of other characters of the adult fish.

Along with the herring larvae numerous other fish larvae in different stages of development were taken with the Young Fish Trawl and identified and Dr. Schnakenbeck has published in "Bd. IV, 4, der Berichte der D. W. K." a contribution to our knowledge of the development of these marine fishes, with numerous illustrations, as a continuation of a previous publication by Prof. W. Mielck (Berichte der D. W. K., Bd. I, 1925).

For the study of the food of the herring numerous plankton samples at different depths were taken on the cruises for scientific investigation and these will be worked up together with earlier samples of a similar kind, except however where this work was already concluded. The results obtained from the plankton samples made in the northern North Sea in the late summer of 1928 appear to indicate a surprising scarcity of those organisms which are of special importance as herring food.

Norway.

A cruise with the "Johan Hjort" was made in August 1928 to Orkney, Shetland and the Faroe-Shetland Channel with two oceanographic sections across the North Sea (Bergen—Kirkwall and Lerwick—Bergen). The data have been submitted for inclusion in the "Bulletin Hydrographique".

During this cruise samples of herring were collected in order to make possible a closer comparison between herring caught in the area to the north of Scotland and certain herring caught on the Norwegian West Coast which, according to the results of the examination, could not belong to the Norwegian herring tribe, the surmise being that they were stray individuals from the herring shoals occurring near Shetland. The "foreign" herring met with at the Norwegian coast were caught intermingled with herring which certainly belonged to the Norwegian tribe. Therefore it was considered to be of special interest to ascertain whether the Shetland herring in a similar manner was admixed with individuals of Norwegian origin.

The method of comparison in these investigations, which are not, as yet, finished, is a combination of biometric data with observations on the scales. A description of the procedure is given by Mr. Einar Lea in his paper "The Herring Scales as a Certificate of Origin" in the special volume of the "Rapports et Procès Verbaux" on race investigations, Nr. LIV.

Scotland.

The continuity of the work in Scotland which during the last few years has been directed chiefly to the study of the herring and haddock was maintained and the Research Vessel "Explorer" was kept in commission for the greater part of the year surveying the northern North Sea in a series of cruises designed specially for the elucidation of different aspects in the life-histories of these two important species.

Hydrographical, plankton, and biological observations were carried out not only on special cruises but as part of the routine on the trawling and drift net surveys of the area.

The trawling experiments were made over as wide an area as possible at different seasons of the year with a view to completing the census of the haddock population obtained from the systematic collection of market statistics and of ichthyometrical measurements in the market and at sea on board commercial vessels. The more detailed analysis of the haddock stock was accomplished by means of copious scale samples collected on the cruises of the Research Vessel and supplemented by special samples collected in the market.

The haddock investigations carried on intensively in the North Sea area for a number of years are now at a stage when it appears desirable that similar intensive observations should be extended beyond the limits of the area. That the North Sea is not a self-contained area with respect to the haddock has already been shown from the results of occasional visits to the north and west coasts of Scotland. It is therefore important that the investigations should be carried into these areas with more or less seasonal

regularity. These grounds, however, are not so easily fished as those of the North Sea not only on account of their distance from the headquarters of the Research Vessel but also because there is a much greater extent of rough ground in that region. During the month of August therefore one of the main objects of the cruise to the north and west of Scotland was to select suitably disposed representative grounds where seasonal trawling observations could be made without risk of serious damage or loss to fishing gear.

During the last three months of the year under review the weather conditions in the northern section of the area were unusually severe, causing considerable delays and changes in the scientific programmes. This was the more unfortunate in view of the fact that the 1928 haddock brood was exceptionally successful in the northern and western sections of the area and that the planktonic conditions in the North Sea also appeared to be exceptional.

The following is a brief outline of the cruises undertaken during the year and the main objects of investigation on each cruise.

February—March: Trawling experiments with different types of trawls and cod-ends. The Swedish savings gear.

March: Haddock distribution and scale-age-determination on the East Coast of Scotland. Marking of small plaice in inshore waters.

April: Hydrographic and plankton survey of the area between Aberdeen and north of Shetland.
Distribution of the various age groups of haddock.

May: Hydrographic and plankton survey from Aberdeen to north edge of Dogger Bank.
Distribution of the haddock age groups.
Marking of small plaice in inshore waters east of Scotland.
Distribution of unscaled stages of the spring and autumn broods of herrings in the Firth of Forth.

June: Extended survey with drift nets of the herring fishing grounds from Rattray Head to northern edge of the continental slope and to the west of Shetland. Trawling, hydrographic and plankton observations.

July: Trawling surveys (a) Firth of Forth (b) Moray Firth, Fladen Ground, Fair Isle, Foula and west of Orkney.

August—September: Extended trawling, hydrographic and plankton cruise.
(a) Trawling observations north of Scotland.
(b) Co-operative hydrographic survey with H. M. S. "Flinders" of the north-western area from Wyville Thomson Ridge to Butt of Lewis and St. Kilda.
(c) Trawling experiments in the West of Scotland.
(d) Survey of the Firth of Clyde.
(e) Plaice investigations in Luce Bay.

September: Incidence of hatching of the autumn brood of herring on the north and east coasts of Scotland.

October: Trawling observations in the middle North Sea and Firth of Forth.

November—December: Survey of the area from Aberdeen to Shetland. Transplantation of small plaice from the East Coast of Scotland to the west side of Shetland.

December: Trawling experiments on the near grounds East of Scotland and in the Firth of Forth. Observations on the occurrence of the unscaled stages of the autumn brood of herring in the Firth of Forth.

Haddock.

An outline was presented in the last report of the position reached in the current Scottish investigations of the Biology of the Haddock. It was stated that the estimation of the composition of the North Sea stock had become a matter of routine, but that a broadening of the sources of data for accurate age-determination, especially in the south-eastern part of the North Sea and in part the Atlantic seaboard of Scotland, was requisite to secure sufficient accuracy for the purpose of estimating the course of the fishing for a period of years ahead. It is hoped to arrange in due course for the routine collection of the requisite extra data.

The results of the year just closed again confirm the adequacy of the methods employed in stock-estimation, no discrepancy being apparent. Thus the prominent year classes of haddock (those of 1923 and 1926) have diminished in numbers to the usual degree. The former (in its sixth year in 1928) yielded catches of only about one-thirtieth the numbers taken in the first year or two of its life and is thus practically beyond influencing the commercial catches to any noteworthy degree. The latter — also a rather successful brood — proved, as was anticipated, the mainstay of the catches almost everywhere in the North Sea. Of the other broods those of 1924 and 1925 (fourth and fifth year fish) were of less importance, while that of 1927 (second year fish) was an almost total failure. The brief period of rather lighter catches anticipated in the last report may therefore be said to have set in in 1928 and will probably continue until late in 1929 when the very numerous 1928 brood will begin to increase the catches. The depression in the catches probably will not be so marked as it was after the failure of two consecutive broods — those of 1921 and 1922 — since recently no two successive brood years have been unproductive. The North Sea haddock fishery continues to be one harvesting mainly young fish which only pass beyond small-medium size in the south-eastern North Sea and one or two other localised areas of rapid growth-rate.

A study of the stomach contents of haddock from the areas of distinctive growth-rate is in progress. Both the quantity of food and its nature are being determined. Where the data are numerous there is complete agreement between quantity of food found and the resulting growth-rate of the haddock. Thus the deep central portion of the North Sea, where the growth of the haddock is slowest, provides the smallest quantities of food, and in the five sub-divisions of this area (in order of decreasing growth-rate) the food contents of the stomachs are found gradually to diminish. The season of greatest growth in length of the haddock extends from June to November, during which it is found that the average contents of the stomachs are about twice as great as in the remaining months, December to May. Both at the commencement (June) and termination (November)

of the feeding period "spurts" occur, the volume of food being greatest in these two months. In November especially, the haddock of certain areas are literally gorged. For example, many migrants from the East Scottish Bight on their journey north to the spawning grounds may linger in the neighbourhood of Aberdeen Bay where a rich crop of Razor shellfish (*Solen*) and to a lesser extent lugworm (*Arenicola*) is taken. The volume of the stomach contents of these migrants is, at this time of the year, ten times greater than the volume yielded by haddock a few miles further offshore. These migrants from further south have previously been feeding largely on shrimps (*Crangon allmani*) which among the Crustacea appear to play a very important part in the diet of the haddock of the East Scottish area. Quite another type of Crustacea — though of much the same size as the shrimp — forms the major part of the diet of haddock selecting the southern Moray Firth as their feeding ground. This is *Calocaris*, whose life history and distribution are also worthy of special study. In the northern portion of the Moray Firth and off Orkney the young haddock population is dense and a wide variety of animals is preyed upon. So keen is the competition for food that even young sea-squirts (*Ascidiella*) — never eaten in areas providing in addition a more attractive diet — are taken in considerable quantities. Herring are also pursued to a greater extent than usual but fish do not form an important part of the food of the haddock in the North Sea. Herring eggs are found in quantities during the herring spawning period in autumn, the times and places of occurrence of the "spawny" haddock being remarkably consistent from year to year. In general the haddock displays a catholic taste with regard to its prey. Crustacea, annelids, brittle stars, and molluscs are about equally the chief sources of supply. First year haddock have so far been found to take any of over seventy species in one or other of these groups. It is noteworthy that proof has this year been obtained that haddock at this early stage are not exclusively bottom feeders but may make excursions to some distance off the sea-floor in search of food. Thus in October the food of a large catch of young haddock in the East Scottish Bight proved to consist entirely of *Limacina*, so that this shoal of fish must have made an excursion into the upper water layers within a few hours of capture. Another shoal of baby haddock — this time in the outer waters of the Moray Firth — was feeding, in September, on the small Crustacea, *Calanus finmarchicus* and *Temora longicornis*, both of which must have been captured some distance from the sea-floor. These facts go a good way towards explaining why one's estimates of the numerical strength of new broods, based on captures in the first year of life, are often on the low side.

Herring.

The study of the early life history of the herring up to the time when the adult characters are acquired has proceeded along the lines of research as indicated in recent reports. The wealth of material relating to this aspect of the subject collected more or less continuously over a long series of years has been examined by Dr. Clark and a short review of the results will be presented at the meeting of the Commitee.

The observations on the distribution and dispersal of the larval herring during 1928 show little deviation from the normal conditions. The localities of incidence of the

young larvae have received confirmation from the records of "spawny" haddock which were systematically collected during the year. Spring spawning on the Viking Bank area has again been confirmed. Evidence of early autumn spawning and hatching was obtained at the beginning of August from the Wick and East Orkney grounds. The great wave of hatching however did not appear in the area until September, thus agreeing well with observations in other years. Normally a great many of the larvae born on the more northerly spawning grounds in August, September and October are carried southwards by the prevailing currents. There is a tendency for a part of this stock to be gradually deflected in an easterly direction but as a rule many are also carried coastwise towards the East Scottish coast and into the estuary of the Firth of Forth. The easterly trend of the larvae in the neighbourhood of the southern Fladen Ground was in evidence in September and October. The movement of larger larvae towards the East Scottish coast, which has been a characteristic feature of most of the earlier years, was, however, much less pronounced, as instanced by the paucity in numbers of these forms within the Firth of Forth area from October to December. The offshore records suggest that in some years the Firth of Forth may receive a small supply of autumn spawned larvae, the bulk of these being carried past by the prevailing current in a southeasterly direction at some distance offshore.

As in the previous year no evidence was obtained prior to mid-September of autumn hatching of any importance along the west coast of Scotland to the south of the Minch although young larvae were present along the north of Scotland before that date.

Further successful capture of the larger transition stages were made during the year and new observations are now available from voluminous material collected at the Shetlands and along the west coast of Scotland.

There are obvious differences between these large transition stages from different areas suggesting different origins of the shoals. The material collected is therefore being utilised largely for a careful study of the morphological differences from the point of view of brood and race, special attention being devoted to the determination of the period when the adult characters are fully acquired.

Our knowledge of the distribution, conditions of occurrence, and rate of growth of these transition forms is still far from complete but the main point at issue is their relation on the one hand to the younger larval forms and on the other to the fully scaled individuals of the 0-group.

During 1928 new data relative to the distribution of the 0-group have been collected. Previous records of this group have been made in the estuarine and coastal areas and in the open sea only east of Aberdeen and southwards with an outstanding record from the region of the Viking Bank. In September 1928, however, 0-group herring were found in the stomachs of whitings caught on the Fladen Ground and near its southern limits at a depth of 80 fathoms.

Herring of the 0-group are as a rule only found in relatively small numbers in the Shetland coastal area in spite of its close proximity to important spring and autumn spawning grounds. The occurrence of enormous numbers of small herrings in the Voes and Sounds round Shetland in October is therefore worthy of note. They were first ob-

served towards the end of September when they had a mean size of about 9,5 cm. They remained in the vicinity throughout October disappearing therefrom about the first week in November. The shoals were exceptionally dense all along the west coast and also in the various Voes in Yell Sound. They were also equally numerous in Bressay Sound on the East Coast but appeared to be only in very small numbers east of Yell Sound and absent altogether from Unst Island. According to the statements of the natives a similar occurrence has not been observed during the life time of the oldest inhabitants. An indication of the presence of young herrings in Shetland waters was obtained in June when large numbers of the transition stages were caught by shore seine in Ronas Voe on the west of Shetland.

The working up of the distribution of the young scaled herring of the 0 and 1 year groups is now well advanced. Additional observations have been made on the food of these small scaled herrings in the different areas.

The special samples of adult herring collected in 1928 to supplement the material collected in previous years have been analysed with regard to degree of maturity of the sexual organs with a view to tracing the movements of the maturing fish on the inshore and offshore ground prior to and at the spawning period.

Special observations were also made on the degree of maturity and on the food contents of the herring on the West Coast. The question of the extent of the autumn spawning in this region still remains to be solved. In the months of August and September over two thousand herrings from the Minch and Coll-Tiree grounds were examined. Most of the herrings were adult, only a relatively small percentage being recorded as immature. Adult individuals at practically every stage of development of the reproductive organs were present in every sample. No sharp line of demarcation could be made between the different stages of development which ranged from young fish with sexual organs just beginning to show signs of development or spent fish almost fully recovered and again beginning to show signs of development to fish with reproductive organs almost fully developed and apparently almost ready for spawning. No individuals, however, were obtained which were actually in the spawning condition and it was therefore difficult to determine whether the fish in this area were predominantly autumn or spring spawning fish. As already stated, no evidence of autumn hatching on the west coast prior to mid-September was obtained although numerous plankton collections were taken.

All these herrings were feeding heavily and quantitative analyses were made of the food contents of the stomachs. The main constituent of the food of the herrings caught in the Minch was larval sand-eels, while in those from the Coll-Tiree grounds Schizopods and Copepods predominated. In the Minch area, however, sand-eels were most numerous on the western side and although Crustacea assumed greater importance on the east side, *Limacina* was more in evidence. Practically no larval sand-eels were obtained in the Coll-Tiree herring.

The Racial Investigations begun last year have been extended. The observations are being limited as far as possible to homogeneous material, the samples being drawn from either spawning shoals, young fish in the transition stages or unmixed shoals of the 0-group of scaled herring.

Marking Experiments.

During the year 3,344 plaice, 1,004 lemon soles and 198 skate were marked and liberated. Recaptured fish returned to the Laboratory numbered 1990, and of the total 1749 were plaice, 137 lemon soles and 73 skate.

In continuance of the experiments of last year when 885 marked plaice were transplanted from the inshore grounds on the East of Scotland to the coastal grounds of the East of Shetland 600 small plaice were transplanted this year to the coastal grounds of the west coast of Shetland. Control experiments were also made. While the transplanted plaice from last year's experiment exhibit accelerated growth rate, the main object of these experiments has been to determine the movements of the growing plaice from the inshore Shetland waters. The Research Vessel, however, is as a rule unable to capture in the area itself in a limited period a sufficient number to satisfy the needs of the experiment. Previous plaice marking experiments have shown that some of the maturing fish may migrate from the area in a southerly direction to the Moray Firth spawning grounds.

Hydrographical and Plankton Investigations.

During the year 1928 these investigations were continued on the lines of former years mainly as an integral part of the Fishery Researches.

In these surveys when serial temperatures and salinities form the main items on the hydrographic programme, together with meteorological observations (i. e. air temperature, barometric pressure, wind direction and force etc.) endeavour is always made to work numerous stations in linear arrangement and to repeat observations seasonally at "fixed" stations with a view to maintaining continuity.

The stations forming such sections to the East of the Orkney and Shetland Islands again received most attention throughout the year.

In accordance with the recommendations of the Hydrographic Committee a co-operative survey of the area north-west of the Butt of Lewis was carried out in August by H. M. S. "Flinders" and the Research Vessel "Explorer". A member of the scientific staff from the "Explorer" accompanied H. M. S. "Flinders" to assist with the observations at sea. The observations on H. M. S. "Flinders" were made at stations 10 miles apart along a line running 120 miles N. W. from the Butt of Lewis, while the "Explorer" surveyed the areas to the north and south of this line at the same period. The northern area was surveyed along the lines North Rona to Wyville Thomson Ridge and thence to the Butt of Lewis, while the southern area was traversed from the Sound of Harris to the edge of the continental shelf beyond St. Kilda and thence to Butt of Lewis. Both on H. M. S. "Flinders" and on the "Explorer", in addition to the routine temperature and salinity observations, samples of water were collected for the determination of the hydrogen ion concentration and for the estimation of the phosphate and nitrate content at all depths. A series of oxygen determinations was also carried out on board the "Explorer".

The salinity determinations were made in all cases by the Government Chemist

and the hydrographical data were later submitted in the prescribed tabular form for publication in "Bulletin Hydrographique".

A series of surface drift bottles was liberated on the West Coast of Scotland and in the Shetland area.

The extensive plankton collections made on all the cruises are being worked up mainly with a view to determining the main spawning areas of the herring and haddock and the dispersal of the young therefrom. During the year however an intensive study has been made of the seasonal distribution of the various stages of *Calanus finmarchicus* by means of numerous quantitative hauls with the Hjort vertical closing net.

Although the plankton observations were much interrupted by the continuance of unfavourable weather conditions during the last three months of the year the records show somewhat exceptional planktonic conditions in the northern North Sea during this period. There was a comperative scarcity of the normal Copepod forms except in the neighbourhood of the coast, while the north-western area of the North Sea was penetrated by considerable numbers of *Doliolids*. As a rule these forms do not penetrate the North Sea area although in some years they may be carried over the Faroe-Shetland Channel into the Norwegian Sea in considerable numbers. As a matter of fact they do not appear to have been recorded from the North Sea during the last twenty-five years. On the other hand tremendous numbers of Salps flooded the area in 1905 and again in 1920 and 1921. It is therefore significant of the complexity of the problem of the interchanges taking place between the Atlantic and North Sea that the Salps did not appear in the north-western area this year. The phenomena appear to suggest that the Atlantic water which penetrates the North Sea through the northern passages may be derived from different sources in the Atlantic in different years or in other words that the volume, direction and time of flow of the Atlantic Stream may vary independently and thus cause complex changes in the plankton content of the different regions into which it penetrates.

Sweden.

The material of the Witch (*Pleuronectes cynoglossus*), collected during the cruise 1927, has been more closely examined. It has been shown that different growth rates exist in different parts of the North Sea. As an example it may be mentioned that the Witch in the area round Fladen Ground, Bressay Shoal, has a more rapid growth than in the north region off Utsire on the west coast of Norway. In order to obtain a clear understanding of this fact racial investigations are now going on.

Any very strong year classes have not been demonstrated during the years 1925—1927, although the year group of 1921 was comparatively rich (12—16 per cent.).

The material of the young larvae collected shows that important spawning places are located on the Fladen Ground, the region east from Shetland, Bressay Shoal and Bressay Ground in depths of 120—160 m. The examination of the gonads during the cruise gave the same results.

SOUTHERN NORTH SEA

By

W. Mielck.

A. Preliminary.

The work of the Committee was, as in the foregoing year (1927), mainly directed to extend our knowledge of the yearly fluctuations in the size of the fish stocks, and to ascertain the natural causes of these fluctuations. Since the temporary rejection of the work directly devoted to protective measures, these endeavours have come increasingly to the fore in the southern North Sea. It is recognized that the solving of the problem of the fluctuations is indispensable for the further study of the effect of the fishery on the stocks, of the bottom fishes as well as of herring and other migrating species. This purpose calls of course for the continuation of the work devoted to it for a series of years and for investigations in almost every branch of ocean research. The observations on the density of the stocks of different species and on their age composition and growth rate, which were continued in 1928 by all the countries, furnish a test of the existence and extent of the fluctuations. Endeavours are being made to ascertain the natural causes of the fluctuations through investigations, also continued, into the factors on which depend the satisfactory development of the fish and their fry, and their migrations, viz. hydrographical conditions, food (benthos, plankton), and enemies, and into the still less known annual changes of these very factors.

Already in last year's report it was considered that fluctuations could be brought about not only by the changes in natural conditions but also by the effect of the varying extent and nature of the fishery, which our statistical work on fisheries enables us to study. The wish, expressed in 1928, for a greater uniformity of the manner in which statistical material is collected and arranged and for a universally high level of statistics may be repeated here.

It must, however, be added that also the scientific apparatus and methods, and the manner in which they are utilized, in many cases need still greater uniformity for the purpose of obtaining better comparability in the results of those working at the same task. It is particularly necessary where a common attack is being made on a problem which demands extensive observations of many years' duration, such as the problem of fluctuations.

The propounding of a main problem to indicate the lines on which the work in our area is to proceed has proved up to now practical and fruitful. The problem now being dealt with is calculated to avoid the splitting up of forces and to unite to a high degree into a common aim the endeavours of the available workers and the various branches of investigation — viz. those concerned with the fish stock, food, the benthos and plankton, and finally also hydrography.

With a view to utilizing the results obtained from the study of fluctuations in a practical manner for the benefit of the fishery, we may adopt as our immediate aim

the answering of the following question; i.e. is it possible from the frequency and growth rate observed in the age-classes which are not yet marketable to forecast the good and bad prospects for the catches of the species of fish in question for the coming years. Even though at the present stage of our knowledge we must still refrain from promising such forecasts to the fishermen it does nevertheless seem practicable in the case of the herring, and similarly the results obtained up to now relating to the sole and plaice point to this possibility.

The following report should reveal the connexion between the work of all the countries, and the endeavours to make it still closer, and at the same time the progress made in such other investigations as have arisen owing to the scientific and practical interests of the separate countries.

Work at Sea.

By the research steamer "Oithona" experimental fishing and other oceanographical operations were pursued near the Belgian coast.

The Research Vessel "George Bligh" was in commission from April to November in our area. Four voyages were made for the purpose of work connected with the fisheries, in May and September along the line Leman Ground—Haaks Light Vessel, and in June and November in the south-eastern North Sea on roughly the same grounds as in 1926 and 1927. Three voyages were devoted to plankton investigations on sections off the east coast of England in April, June, and November, the last of which, however, had to be abandoned on account of the violent storm. Further in May, June and September there were carried out chiefly hydrographical observations, and in April, July, and October investigations on plankton and herring, and hydrographical investigations.

The French work was carried out from the fishery patrol vessels "Sentinelle" and "Estafette" and from the aviso "Quentin Roosevelt", principally in connexion with the study of the Herring in the south-western part of the North Sea and in the Channel.

Also on board the German Fishery Patrol Boat "Zieten" it was possible to carry out investigations on the herring during a cruise in the southern North Sea in October. The Research Vessel "Poseidon" made two voyages in the southern North Sea. Following on a longer voyage for the study of herring in the north-western regions of the North Sea (see Report: Northern North Sea), of which some stations were in our area, the ship was engaged from September 5th—10th in work connected with the study of benthos and the fish stock off Norderney to Borkum. For a second voyage from November 20th till December 10th a more extensive programme was planned, which was devoted chiefly to the plaice stock which was then in its winter resting period and to the distribution of the herring larvae. The work was impaired by the unusually bad weather; nevertheless fishery investigations were carried out mainly in the south-eastern part of our area, and numerous stations for the study of benthos, plankton, fish fry, and hydrography were taken up in the south-east and south-west. The "Augusta" was employed for repeatedly checking the fish stock in the vicinity of Heligoland and on the sections running obliquely to the coast as also for the saving trawl exper-

iments. For the work close inshore connected with the study of young flatfish smaller motor boats were used.

In Holland in the course of 1928 a Government motor vessel, the "V. I. 2", became available for work at sea, near the Dutch coast at least.

The Danish investigations in the North Sea in 1928 are restricted to the Ringkøbing Fjord (spring and summer) and the Limfjord (April—October) and the adjacent coastal waters of the North Sea proper (September, November, December).

By the Scottish Research Steamer "Explorer" three excursions (in May, July, and October respectively) were made into the southern area, chiefly along the Northumberland coast and the north edge of the Dogger Bank, with the main object to extend the haddock investigations.

In addition, as in former years fishing vessels, lightships, and steamers plying on established routes in all countries have afforded very valuable assistance for biological and particularly hydrographical studies.

B. Fish.

I. General.

1. Statistics and Ichthyometrics. The collection has proceeded in England without change of method. The numbers of the chief species measured during 1928 were:—

At sea.

Plaice	Cod	Haddock	Hake	Turbot	Brill	Soles	Total
496,000	26,000	263,000	1,000	5,000	3,000	33,000	827,000

On the Markets.

Plaice	Cod	Haddock	Turbot	Soles	Total
56,000	2,500	14,500	200	800	74,000

All measurements of haddock made at Sea were placed at the disposal of the Fishery Board for Scotland as in previous years.

All the following figures afforded by the German measurements refer as in the previous year to the work of the Heligoland biologists at sea:—

	Plaice	Other Fish	Total
offshore	30,579	21,231	51,810
inshore	31,596	36,554	68,150
Total...	62,175	57,785	119,960

The German material of measurements and otoliths is twice as large this year as in 1927. The working up of it has, however, been rather delayed owing to the prolonged absence of one of our workers (Dr. Bückmann) who has been engaged in a comprehensive work, dealing with the methods of marine fishery investigations for Abderhalden's hand book of the methods used in biological work.

The market measurements formerly carried out by HENKING were recommenced in Wesermünde on the initiative of the Heligoland Institute. It is planned to retain permanently, as in England, this indispensable feature, which supplements the work at sea and the official statistics, and amongst other things to take, in the first instance, measurements etc. of the categories of the market sortings as entered in the statistics.

In Belgium attention has been paid to the market statistics and help given to the "Office de la Pêche maritime" for the final organisation of the statistical service in all fishing towns of the coast. Weekly fishing with commercial trawls has been carried on by two boats as before for analysis and measurements. Many thousands of fishes — especially young fishes — have been measured.

2. Littoral Fishing. Professor GILSON's paper[1]), relating to the Belgian fishery investigations, has been published; it deals with the results obtained from the study of the plaice, the sole, and the dab, whilst the other species are to form the subject of a further publication. The data which have been grouped according to the various points of view afford extensive information as to the actual catches of the coastal fishermen and the destruction of the small flatfish, concerning which no statistics have hitherto been compiled in the North Sea. As regards the question of a size limit, which the author deals with in detail, the limits of 18 cm. and 25 cm. are discussed from the point of view of what effect they would produce and what their adoption would mean to the fishermen; 22 cm. is thereupon recommended. Apart from their importance as a basis for measures which would afford protection to the fish progeny, the results of the analyses of catches which have been made every week for 16 years are of great interest in connexion with the problem of fluctuations which is now being universally attacked.

The investigations on the frequency, distribution, migrations, and growth of the youngest bottom stages of the flatfish species which live close inshore must be looked upon as one of the most important pieces of work relating to this problem of the fluctuations. The chief aim is at present to test whether considerable annual fluctuations in the quantity and growth can be traced already in the case of the 0- and I-groups, and whether they recur in the following years in the trawl hauls in the case of these year-classes which in the meantime have become the II, III, etc. groups.

The German investigations were extended to cover the East Frisian coasts, otherwise the same localities and the same days for the work as in the previous year were as far as possible chosen. They took place in the mouth of the Elbe (months III, VI, VIII, XI), off Büsum (VIII), off Norddeich and Juist (VI, VIII), List—Sylt (VII, VIII) and moreover each month (V—XII) at the Heligoland Düne, in order to observe with accuracy the growth of the young plaice. Altogether there were examined 287 hauls of 10 minutes' duration with the Johansen-trawl and numerous catches with seine and push-net; moreover 28,802 plaice of the 0-group, 2,894 of the I- etc. groups, 23,290 flounders, 6,318 dabs, and many young soles, turbot, brill, and round fish were mea-

[1]) G. GILSON, La Pêche littorale sur les Côtes de Belgique. Rapp. & Proc. Verb. Vol. LI, 1928.

sured, age-determinations from the otoliths of plaice being carried out to the necessary extent.

It is also intended to conduct investigations of a like nature on the Dutch coast. The Belgian, Dutch, and German investigators wish to prepare a uniform plan for continuing the work. A meeting which had been planned for November at Delfzyl to demonstrate the methods hitherto employed had unfortunately to be abandoned at the last moment owing to the bad weather and postponed to the following spring. Also in Boulogne-sur-mer work was in progress last year relating to the biology and distribution of the young pleuronectids.

The extension of the work to cover a wide district comprising as far as possible all the shores of our area, and a system of work with uniform methods will render possible comparisons as regards phenology, the conditions relating to migration, quantity, and growth, and the phenomena of the fluctuations, without which these investigations would not have their full value. Besides information on the flatfish, they afford abundant data as to the fauna which live with them and influence their development, and as to other food fishes. It may here be pointed out that our knowledge, as to the biological conditions of the coastal zone and the young fish living there, in general lags behind the progress made in the open sea, although the work in the neighbourhood of the land demands far less expenditure.

In Denmark littoral investigations were carried out in the Ringkøbing Fjord in spring and summer, in the Limfjord in the months April—October and in the adjacent parts of the North Sea (square-areas N 12 and M 12) in September, November, December.

Oyster. Lobster. In the Limfjord the investigations of the stock of oysters were continued and a new paper has been published[1]). A report has also appeared dealing with the studies of fry that have up to now been made in the North Frisian Shallows[2]). These were continued and an experiment was made in the East Frisian Shallows. In Heligoland the experiments in breeding lobster fry artificially have not yet been concluded.

3. Eggs and Larvae. The working up of the older material in Germany was devoted in this year first and foremost to the herring larvae, but progress has also been made in respect to eggs and larvae of other species. A further contribution[3]) was published dealing with the fish larvae of the western North Sea from the late summer and autumn.

4. Food of Fishes. The food investigations were continued in the countries concerned with this question, comparisons being instituted of the composition determined

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[1]) R. Spärck, Studies on the Biology of the Oyster (*Ostrea edulis*) V—XXXIV. Report Dan. Biol. Station.

[2]) R. Kändler, Verbreitung und Wachstum der Austernbrut im Wattenmeer etc. Wiss. Meeresunters. Helg. Vol. XVII.

[3]) W. Schnakenbeck, Beitrag zur Kenntnis der Entwicklung einiger Meeresfische. I. Ber. D. W. K. n. F. IV, 4.

simultaneously at the place of capture by the bottom sampler and of the quantity of food animals, attention being paid first and foremost to the flatfish. In Denmark two new publications[1]) have appeared on this subject (XXXIV Report Dan. Biol. Station). In Germany the quantitative working up of the material has been concluded. Further material was collected only in November—December in various regions of the southern North Sea, in order that also the conditions in winter might receive due consideration. Observations were made on plaice at sea and in aquaria in Heligoland as to the quantity of food consumed daily and the rapidity of digestion. The first publication on the determination of the food value of the most important bottom animals for the fish, in accordance with the methods of food chemistry, will shortly appear. On the Belgian coast researches as regards the food of young fishes and also of other sea animals is being carried on in view of determining the alimentary relations between all sea species in coastal waters. Study aquaria for this work will soon be set up at the "Institut maritime".

5. The Methods of Marking Fish. The marking of the smaller round fish presents various difficulties, which are the subject of a report[2]) that has been prepared of tests in aquaria designed to find the best method and position for attachment of the mark. All known methods were tried and although the experiments did not lead to satisfaction with regard to any method, there is clear indication that some are better than others.

6. Experiments with Saving Gear. Prof. Gilson has taken up again experiments with sparing nets convenient for coastal fishing and shrimping. A new three-boards ottertrawl has been devised and, though not yet perfect, gives satisfactory results.

Experiments have been continued in England as to the size of the various species of fish passing through meshes of various dimensions. Work was carried out on four voyages of the "George Bligh" in the earlier part of the year, with trawls fitted either with the bifid "trouser" cod end, or with a cod end covered with shrimp netting. Large numbers of fish of various species were measured and the work is being continued.

The experiments off Heligoland with a small model of the Ridderstad Trawl were continued and further ones made with a model constructed by the German fisherman Eilt Jacobs. In connection with these experiments measurements were taken of 17,057 fish. Experiments with larger models, for which up to now a larger ship than the "Augusta" has not been available, are planned for the coming spring with the "Poseidon".

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[1]) H. Blegvad, Quantitative Investigations of Bottom Invertebrates in the Limfjord 1910—1927 with Special Reference to the Plaice-Food.

Aage J. C. Jensen, The Relation between the Size of the Plaice Stock and the Quantity of "First Class Plaice-Food" in certain Parts of the Limfjord.

[2]) M. Graham, On Methods of Marking Round Fish with an Account of Tests in Aquaria. Fish. Invest. Ser. II. Vol. XI. No. 4, 1929.

In Holland the motor vessel "V. I. 2" was used for testing a new saving-gear of Dutch invention, in September, off the Texel and Terschelling coast. The results of these experiments showed a remarkably sharp selection at a length of 17—18 cm. in the case of plaice and dabs. It is hoped that similar trials with this device, but of a larger type, may be taken by the International Council, and the Dutch Government will not fail to continue these researches in the open sea.

II. Cod and Haddock.

In the Limfjord investigations of the stock of cod were continued in the spring and summer.

As to the cod and haddock measurements in England see B I 1. A report has been published in two parts giving an account of investigations into the methods of Age and Growth Determination in Cod, and a summary of researches by other workers in age-determination of fish generally[1]).

The material relating to haddock, collected on previous German research voyages and consisting of measurements, age-determinations and the like, is now being worked up in Germany.

To the haddock were chiefly devoted the three excursions (in May, July, and October) of the Scottish "Explorer" into the north-western part of our area. The main object of the trawling investigations was to extend the more intensive haddock investigations made further north with a view to obtaining comparable material regarding the distribution of the various age-groups and to obtaining scale material for the analysis of the voluminous ichthyometrical haddock data collected by the Ministry of Fisheries (England) as an integral part of the haddock programme.

In the Aberdeen Laboratory a number of large samples of haddock scale material collected by Dr. J. J. Tesch, Holland, from the south-eastern part of the North Sea during the autumn months have been examined. The scales were all of one type (Type E) showing a burst of growth in late autumn. The characteristic feature of the collections is the comparative success of the 1926 brood and failure of the 1927 brood in the area. The 1926 brood predominated in all catches except in Jutland Bank. This latter fact is important as groups 1925—1923 were plentiful, suggesting conditions better for larger than smaller haddock here.

On methods of marking round fish see B I 5.

III. Herring.

1. Statistics. In England the yearly and monthly statistics as to landings have been continued. The statistical working up of the German trawl and drift net catches, which has been continued in Hamburg, showed that in 1928 of the total trawl catches,

[1]) M. Graham, Studies of Age-Determination in Fishes. Fish. Invest. Ser. II. Vol. XI, Nos. 2-3, 1929.

amounting to 48 million kg., 5 million kg. were landed in British harbours. A considerable portion of the catches originated this year no longer from the North Sea but from the waters to the west of Great Britain. A further report[1]) with monthly charts for 1927 has been issued on the operation and intensity of the drift-net fishing in the western North Sea.

2. Analyses of herring catches, for the study of the composition as to age-class and sex, of maturity and growth, and of the state of nutrition. The samples examined in Hamburg originated from the voyages of investigation and from the fish markets in Altona and Lowestoft. In the case of the Bank herring it was the year-classes 1922 and 1924 which were conspicuous for their numerical abundance, and in the case of the Lowestoft herring it was the 1921 year-class. Likewise in the Lowestoft laboratory unsorted samples have again been examined throughout the year. The fisheries of the Northumberland coast, the Yorkshire coast and the Southern Bight have been examined in detail as to age, length and maturity. In all, 55 samples of over 100 fish each, have been examined, in these three areas. The main feature of the East Anglian fishery was the large numbers of 1921 year-class and the still greater proportion of 1924 year-class. Investigations of this nature have also been continued in France according to the hitherto prevailing plan; a rich material consisting of measurements, determinations of maturity and growth has been collected relating to the various populations of the eastern Channel and of the southern entrance into the North Sea.

3. Young Herring. Monthly observations off the French coast on the length of the 0-group, which populates the coastal waters and particularly the mouths of rivers from July till January, produced the following measurements for the mouth of the Liane.

July—August	37— 95 mm.	(Mode	80.	Average	75.5)
September—October	50—105	—	(—	85.	—	83.2)
November	73—112	—	(—	87.	—	83.2)
December	83—155	—	(—	95.	—	99.2)

Since November an increasing number of sprats have appeared amongst the young herring, also some sardines, 35—45 mm. in length, have been collected from amongst them in the course of November.

From the East Coast of England samples of 0-group herrings were obtained from various points from Bridlington to the Thames estuary, by means of a lance-seine. The measurements of the fish agree well with previous records from the same area.

At the Ostend market the percentage of young herring was ascertained for each sample during the whole course of the sprat season.

4. Location of spawning places and larval Herring. The Danish colleagues made investigations as to the spawning places in the square-areas N 12 M 12 in November and December. An English report on the location of spawning places,

[1]) H. Lissner, Monatskarten zur deutschen Grossen Heringsfischerei 1927. Ber. D.W. K. n. F. IV, 1.

with special reference to "Spawny Haddock" has been published in the "Journal"[1]). The French research workers are collecting information as to the different periods of spawning and as to the position of the spawning places in the eastern part of the Channel and in the southern entrance to the North Sea.

A preliminary communication on the results of the working up of the older German larvae material from the winter months was made by Mielck in the reports of the scientific meetings of the Council. Further some data are given on the catches of larvae from the British East Coast between Peterhead and Shields from September 1925 in Schnakenbeck's work mentioned above under B I 3. Still further material from the autumn cruises of the last few years in the north-western North Sea awaits working up. In August—September of this year it was considerably augmented, whilst in November—December a similarly large material was collected in the southern North Sea. An attempt is to be made in Hamburg to discover differences in morphology and of development of local forms in older larval stages, particularly differences in the time of the formation of the fin rays, vertebrae, and other features of the adult fish.

5. Rate of Growth and

6. Study of herring races. Extensive observations on the growth of the herring, particularly in their first year, have been made in England. The results are being embodied in a report in preparation on the different types of herrings in the Southern North Sea.

The racial investigations continued in England and Germany are to be given a better basis, upon the proposal of Dr. Lea, Bergen, through the cooperation of investigators in Hamburg and Lowestoft in accordance with a common plan by extensive studies of the growth of the various year-classes. In Germany, in addition to the material mentioned in Section 2, also the easily obtainable material relating to the I- and II-groups was utilized for these investigations, afforded by the winter fishery in the area where the Elbe, Weser, and Jade discharge.

The results of the English race investigations show that it is no simple matter to divide the fish of the southern North Sea into distinct types according to vertebrae but, at the same time there is an indication that the herrings of the Yorkshire Coast have a smaller average number of vertebrae than the fish on the grounds to the North and South of that area. The vertebrae of 52 samples of over 100 fish and 6 samples of 0-group herrings have been counted.

The Dutch colleagues studied samples of drift-net herrings from the southern North Sea in the autumn of 1928. Altogether in about 800 spec. the usual race characteristics and rate of growth by means of the scales were studied. The material has not yet been amply studied, but it may be said that none of the samples enclosed to any degree the well known Lowestoft or Channel Sea herring, on which the autumn drift-net fisheries are believed to be chiefly dependent. This result is in accordance with the con-

[1]) W. C. Hodgson, Some spawning places of the Herring of the southern North Sea. Journ. du Conseil. III, 2.

clusions arrived at in preceding years. The investigations unhappily came to a rather untimely end, as supplies of fresh herrings at Ijmuiden unexpectedly closed about the middle of December.

In the Laboratory at Boulogne-sur-mer samples from various regions were examined with especial reference to the variability of the mean number of vertebrae, the following figures having been up to now obtained:—

Herring from	Dyck-Sandettie (Calais coastal region)	mean 56.59
—	— Boulogne (Gris Nez to mouth of Somme)	— 56.49
—	— Dieppe (south of the Somme)	— 56.84
—	— Start Point (England)	— 56.78
—	— Dover Channel (west of Colbart)	— 56.70

These figures are at present regarded as not yet final, as the herring season of 1928 had not yet come to an end.

7. Food investigations. See D. Plankton.

IV. Plaice.

The chief work also in this year took the form of continued checking of the stock by taking measurements, investigations of age and growth in the market and at sea, and the testing of statistics, in order that any changes that occurred might be accurately noted and the causes as far as possible ascertained.

1. Statistics and Ichthyometrics. The routine work of measuring plaice on board commercial vessels at sea and also of the various Trade Categories recognized on the markets at Lowestoft and Grimsby has been continued. As has been shown (see B I 1) a large number of fish were measured both in England and Germany, the German numbers, however, referring only to measurements at the research vessel, for the market investigation will not begin before 1929.

2. Seasonal Distribution of the stock. The investigations carried out from the "Poseidon" in 1923—26 on sections running obliquely to the coast afforded clear evidence as to the seasonal changes in the distribution of the stock in the German Bight in spring, summer, and early autumn (see Ber. D. W. K. n. F. Bd. II H. 1 p. 9ff. and Bd. III H. 1 p. 1ff.). In 1928 similar investigations were to have been made in the winter in order to ascertain whether the coastal migrations of the fish that are not yet ready to spawn take place already in early winter, and whether the fish pass their winter resting period buried in the bottom, and if so where. Owing to the unusually bad weather, however, only the sections down past Amrum and Norderney and to the west of Haaks could be worked. Off Norderney about the same frequency and distribution was found as in September of this year, and the younger classes, mainly the I- and II-groups were abundantly represented. These stations were taken up before the violent storm. After

the latter the outer stations and the Amrum section presented quite a different picture. The catches were much smaller than before and the young groups in particular were quite scarce. Experiments with a chain towed at some distance in front of the ground rope in order to stir up the fish from the bottom gave, however, no results, as the catches were much the same with and without the chain. Similar experiments are to be continued in the early spring. On the Haaks section (after the storm) the small groups were represented in quantity and revealed thereby no signs of a winter resting period.

3. Age-Determinations. Four cruises of the "George Bligh" were devoted to the capture of plaice in order to collect otoliths for growth rate calculations and the study of fluctuations in abundance of the various brood years. The line of stations from the Leman Ground to the Haaks Light Vessel was trawled in May and September, the entire catch of 3,640 and 1,579 plaice respectively were measured and otolithed. In both periods the III-group (year-class of 1925) predominated with a secondary mode of the VI-group (year-class of 1922).

In June and November approximately the same grounds were trawled as in 1926 and 1927 in the vicinity of the Danish, German, and Dutch coasts. The following numbers of otoliths were obtained:—

	June	November
Near Horns Reef	643	497
Near Graa Dyb	1034	550
Off Sylt	1022	816
Off Heligoland	476	393
Skiermonikoog Ground	1025	1221
Near Haaks Light Vessel	711	568
Total...	4911	4045

The total number of plaice otolithed in 1928 in the course of the above research cruises was 14,175.

In order to trace the effect of fluctuations of the brood on the landings of plaice, samples of the various trade Categories as sorted on the market at Lowestoft were obtained in April and December. The fish were weighed, measured, and otolithed. The numbers were as follows:—

	Dead Small	Best Small	Small Medium	Best Medium	Large and Best
April	735	389	809	416	227
December	979	318	319	322	229

A brief account of the practical bearing of fluctuations of the stock on the landings based on the material collected up to May 1928 appeared in the "Fishing News"[1]).

[1]) D. E. Thursby-Pelham, Changes in the stock of Plaice in the Southern North Sea. Fish. News, Oct. 27th, 1928.

The German otolith material was collected by the "Augusta" and "Poseidon" in the following regions, the times and quantities being also given: 1) off Heligoland, July 2,693, September 3,849; moreover in early spring at the saving-trawl experiments 952. 2) Norderney Section, May 519, July 704, September 1,632, November 1,327. 3) Borkum Section, September 901. 4) Amrum Section, November 418. 5) West of Haaks Light Vessel, December 646; also, scattered, 104. Total for 1928: 13,745 plaice otoliths.

So far as the material has been worked up, a close agreement is found between the German and the above-mentioned English results and the Danish results mentioned in last year's report: the year-class 1922 (VI-group) was also now everywhere more abundant than year-class 1923 (V-group), whilst 1924 (IV-group), which in the investigations of 1926 off the East Frisian Coast appeared to be a favoured year-class, is no longer prominent, thus not fulfilling expectations. The mode is made up by the year-classes 1925 and 1926 (III- and II-groups). It is not yet possible to an adequate degree to associate the results obtained at sea with the young fish investigations carried out inshore which commenced with the year-class 1926 as 0-group.

4. Rate of growth. So far the material from the German Bight has been worked up, 1928 was a good growth year[1]) for the plaice stock, which was confirmed by the width of the rings found on the otoliths. These results agree with those of the English colleagues: The growth rate of the II, III and V year-groups in May 1928 was somewhat greater than that found in May 1927, while that of the IV-group was the same in both years.

5. Investigation of the younger stages. A report has already been given above (see B I 2) on Professor Gilson's work and on the inshore investigations which have been continued in Germany on a larger scale. They are concerned first and foremost with the plaice and disclosed as a preliminary result that the 1928 brood of these fish was more abundant than the 1927 brood in all the regions for which comparisons could be made, but did not perhaps quite reach the figures of 1926.

6. Food of Plaice. This subject has been already sufficiently discussed in Section B I 2, reference also being made to the special Danish publications on plaice

[1]) Some of Dr. Bückmann's results may be appended here, which reveal in addition to the high growth rate of 1928 as compared with 1925 and 1926 a particularly high rate in row 1). These fish were caught in the region which is particularly abundantly populated by lamellibranchs *(Mactra)*, a report on which will be found in No. 6 (Food of plaice).

	Mean length in cm.					
	♂			♀		
Age group	I	II	III	I	II	III
1) July 1928, 10 naut. miles W. of Norderney Lightship	17.6	19.7	21.7	17.8	20.1	22.5
2) September 1928, Norderney Section	15.3	18.1	21.3	14.9	18.5	22.1
3) September 1926, Norderney Section	13.4	15.4	18.3	12.4	15.1	18.5
4) September 1925, Norderney Section	13.5	15.0	18.5	13.9	15.7	19.3

which appeared in 1928. One particular observation may, however, be of interest to supplement what has been said above. In July the cutters in a certain area off the East Frisian Islands obtained unusually large catches of plaice. According to the fishermen's statements, the fish were very dense and had eaten remarkably large quantities of lamellibranchs. The "Augusta" which was sent a fortnight later to investigate this did not find any plaice in particularly large quantities and especially no large ones, but found on the other hand extraordinary numbers of *Asterias rubens* (about 20 baskets of 1 cwt. each filled from 1 hour's haul with the cutter trawl) and small *Mactra*; also the stomachs of the plaice were full of lamellibranch shells. During the bottom sampler investigations in September spots were found in this area abundantly populated by *Mactra subtruncata* which were about 10 times as abundant as at former samples in this area (see also Section C). There can scarcely be any doubt that these lamellibranchs were both the cause of the accumulation of plaice and of their particularly good growth in July (see No. 4, footnote), and also of the great aggregations of *Asterias*.

7. Marking experiments with c. 1000 plaice were carried out in the Limfjord in April and in the North Sea (square-areas N 12 and M 12) in September. A paper has appeared by Dr. Johansen on "the Extent of the Annual Transplantations of Plaice in the Limfjord and the Yield resulting therefrom" (XXXIV, Report Dan. Biol. Station)

8. Races of Plaice. In the Laboratory of Heligoland, chiefly material from the Barents Sea and the north-west coast of Norway was examined, the former being obtained from the fish markets, and the latter partly from Tromsø and partly from the Director of Fisheries at Bergen, to whom thanks are due. Heincke's report that the Barents Sea plaice have a high number of vertebrae was therewith confirmed, a material difference in this respect from the plaice of north-west Norway being found.

9. Saving gear. Sufficiently mentioned above (B I 5).

V. Other Fish.

Flounders. At the young fish investigations in German inshore waters attention was devoted to the quantity and distribution of the 0- and I-group.

Gurnards. Close studies of edible gurnards were made at the station at Boulogne.

Mackerel and Tunny. The French observations on the distribution of the shoals of mackerel in the eastern Channel and at the southern entrance to the North Sea are to be continued in conjunction with the investigations at the western entrance to the Channel and to the south of Ireland. Numerous measurements were taken. The results relating to *Thunnus thynnus* (Thon rouge) will form the subject of a special publication.

Sardines. The first results of these investigations, commenced in 1926, have been published by M. Le Gall in the Journal du Conseil. According to a further series of observations on the south coast of Brittany it may be regarded as highly probable that the young sardines in the Channel, whose intermediate stages of 10—15 cm. are very rare in the Channel, spend a part of their life along the coast of Brittany. These results

are based on the study of the mean number of vertebrae; in the case of the sardines in the Channel this exceeds 52.00, but in the case of the coastal sardines in the Gulf of Gascogne it is lower.

Sprat. Numerous samples were analysed and measured in Belgium.

Sole. Studies of the biology of the fish are in progress in Germany, both old and new material being utilized. The age-composition of the stock at sea was the subject of further study and 678 scale samples were collected. The predominance of the 1924 year-class, which was already noticed last year, was found to prevail in this spring also. Professor GILSON's above-mentioned work gives a report on the part played by the sole in the catches of the Belgian coastal fishermen.

Zoarces. The stock of this species is investigated in the Limfjord.

Moreover the study of many other species was promoted by the Laboratories working in collaboration, both by working up old material and by collecting new.

C. Benthos and Deposits.

In certain areas near the Belgian coast attention was paid to the invertebrate fauna in connection with the littoral fishing. Researches as to the density of bottom fauna and its variation under the action of continuous trawling are in course of execution.

In Denmark the quantitative work on bottom invertebrates was restricted in 1928 to the Ringkjøbing Fjord and the Limfjord. Meanwhile two papers have been published on this subject (see B I 4).

In Germany this study was continued in the four following sub-divisions:—

1) The examination of the area, 200 square nautical miles in extent, off the East Frisian coast, which is of importance for various questions including that of the fluctuations of bottom animals, was carried out in September, 18 sq. metres = 180 catches being examined with the Petersen grab at 134 stations in all. Whereas at all previous times (1925, 1926) the population of food animals had presented no great variation, it was now much more abundant. At the outer portion of the area a kind of invasion by the lamellibranch *Mactra* (*Spisula*) *subtruncata* had occurred — presumably in 1927 — which, in number, exceeded many times what had previously been recorded, distributed unequally from spot to spot. Attention has already been drawn (B IV 4 and 6) to the phenomena which are probably connected with this, viz. the aggregations and the high growth rate of the plaice, and the great frequency of *Asterias*. Experiments have been made with a Knudsen bottom sampler kindly provided by Dr. JOHANSEN, which produces larger quantities of bottom material and animals per unit of surface than the Petersen grab. This implement proved suitable for occasional sampling in the North Sea but scarcely for exhaustive valuation work. For using this heavy apparatus quite calm weather is necessary.
2) With a view to increasing our knowledge as to the special and quantitative composition of the fauna in a more extended area, 140 grab samples, each of 0.1 sq. metres, were examined in November—December in the south-eastern North

Sea and in the Hoofden at 98 stations. Further investigations were carried out in the shallows. The publication of the works mentioned in Sections 1 and 2 is in preparation.

3) The first publication dealing with the geological and agricultural-chemical study of the bottom samples obtained from the above-mentioned work will also be ready shortly.

4) A part of the material of the "Epifauna", the numbers of which were recorded in all trawl hauls, is in process of being worked up. These animals are of importance, e.g. as competitors for food with the flatfish or as consumers of them.

D. Plankton.

Danish investigations were carried out in Ringkøbing Fjord in spring and summer.

The English, French, and German work was mainly directed towards the relation of the plankton to herring.

The English collections, made on the three plankton cruises were in continuation of last year's work, and the area covered was that of the English East Coast herring fishery, stations being worked 25 miles apart and parallel to the coast. Progress in working up the herring stomachs and plankton collections of 1926, was retarded by the departure of one of the planktologists to take up an appointment in Egypt. — A transparent celluloid bucket, with detachable bottom for use with the International Standard Plankton Net was designed and tested. A description has been published[1]).

The French observations extend to the south-western North Sea and the entrance of the Channel.

The German catches were collected on the "Poseidon", in August in the form of step-hauls in connexion with the study of the food of herring, in December for the purpose of comparison with the food of the fish larvae and examination of the plankton distribution in connexion with the hydrographical conditions, e.g. to define the origin of the water from certain characteristic Plankton organisms contained in it. On this voyage a large vertical net, 7 metres in length and with a mouth of 2.10 metres diameter, was tested for catching larger fish larvae, its capacity being compared empirically with the Hensen net (mouth 0.7 metres) and the Nansen net (mouth 0.7 metres). The capacity (catching power) of the Hensen net is 1.14 times as great as that of the Nansen net.

Scottish observations were made off the Northumberland coast and north of the Dogger in May, July, and October.

E. Hydrography.

Belgium. Hydrographical and plankton observations on lightships have been reorganised and will soon be carried on as before. Surface temperature observations

[1]) R. S. Wimpenny, A Transparent Bucket with a detachable bottom for use with Ostenfeld's and Jespersen's Standard Net for Plankton collection. Journ. du Conseil. III, 1.

on the Ostend—Thames line have been reestablished. A registering apparatus on the inlet pipe of the condensor of S. S. "Saphir" is nearly ready, notwithstanding the well known difficulty in obtaining a satisfactory graph. BROOKS' remarks and suggestions are taken into account. It is also intended to use LUMBY's apparatus to check the registering instrument. Observations on the variation of the p_H and nitrates along the Belgian coast at different stages of the tide have been entrusted to Dr. DELRUE and Prof. DE BOUNGNE.

In Denmark investigations were carried out in Ringkøbing Fjord in the spring and summer, and a paper has been published on results in the Limfjord[1]).

England. Without cessation throughout the whole year, drift indicators have been kept working from two English light vessels. For the entire year, data are available concerning the flow of water past the Varne Light Vessel in the Straits of Dover — generally for three day periods. The same information has been obtained for the Inner Dowsing Light Vessel up to September 1928 and for the Cromer Knoll subsequently. The change over from Inner Dowsing to Cromer Knoll was made because adequate data regarding the former position had been obtained. The records from the Varne Light Vessel up to January 1928 have been worked up and a report published[2]). It has been possible to realize an old standing aim of the Council's Hydrographical Committees by the computation of mean values of the water flow through the Straits of Dover for *(inter alia)* monthly periods. A publication dealing with the comparable records from the Inner Dowsing Light Vessel is now ready. Experiments with new types of drift-bottles have been made in the English Channel and North Sea. In particular the use of short period floating bottles may be mentioned. An account of these has been published[3]).

Surface observations of salinity and temperature have been continued in the North Sea, English Channel, and North Atlantic on the same routes and Lightships and with the same frequency as in 1927. The complete list is as follows and has been inserted in this section for general convenience:—

North Sea.	Approx. Frequency of Sampling.
Shields—Oslo	9 samples a week.
Hull—Hanstholm	do.
"Smiths Knoll" L.V.	Sample every fourth day.
English Channel.	
"Varne" L.V.	Sample every fourth day.
Newhaven—Dieppe	3 samples a week.
Southampton—Havre	5 and 4 samples in alternate weeks.
Southampton—St. Malo	do.

[1]) AAGE J. C. JENSEN, Remarks on the Hydrography of the Limfjord. XXXIV. Rep. Dan. Biol. Station.

[2]) J. N. CARRUTHERS. The flow of water through the Straits of Dover as gauged by continuous current meter observations at the Varne Light Vessel. Fish. Invest. Series II. Vol. XI. No. 1.

[3]) (a) Currents of the North Sea. Fishing News of June 30th, 1928. (b) J. N. CARRUTHERS, New Drift Bottles for the Investigation of Currents in Connection with Fishery Research. Journal du Conseil. III, 2. p. 194.

English Channel.	Approx. Frequency of Sampling.
Plymouth—Guernsey	5 and 4 samples in alternate weeks.
Liverpool—Charente	9 samples a fortnight.
(under the supervision of the Marine Biological Association, Plymouth.)	
"Seven Stones" L. V.	Sample every fourth day.
North Atlantic.	
English Channel—West Indies	30 samples a month.
English Channel—South America	do.

The Surface Sampler has been issued in a modified form to all ships, including lightships, making these observations. The modification comprises the inclusion of the thermometer in the instrument. A description has been published[1]).

Hydrographic observations (mainly salinity and temperature) were made from the research ship "George Bligh" on 5 cruises in April, May, June, July, and October. The cruises in May and June continued the investigation on the relation between salinity distribution and currents. A note on the results obtained from a cruise undertaken with a similar object in 1927 has been published[2]). The hydrographic work on the remaining cruises was done in connection with plankton and herring investigations.

The experiments on a densimeter designed for salinity determination were completed and the results have been published[3]).

France. A number of stations has been made in the southern part of the North Sea and in the Channel entrance.

Germany. Regular observations of temperature and salinity were instituted:

1) once weekly at the surface in the Heligoland roadstead.
2) fortnightly at 4 stations in the vicinity of Heligoland at 0 m., 10 or 20 m., and on the bottom.
3) every three or four days at the surface at the Light Vessels Borkumriff, Norderney, Weser, Minsener Sand, Bremen, Elbe 1, Elbe 4, Ausseneider, and Amrumbank.
4) about 10 observations weekly on the line Cuxhaven — English Channel by steamers plying on the route.
5) every four hours on the direction and strength of the surface current at the Light Vessels mentioned above in 3).

Occasional observations were made on both the research cruises of the "Poseidon", the oxygen being determined at various depths as well as the temperature and salinity. Of the stations visited during the cruise in August, 7 were situated in the northern region of our area. On the cruise in November—December, 60 stations in the south-eastern North Sea and in the Hoofden were visited for investigation, and on both cruises numerous

[1]) J. R. Lumby, Modification of the Surface Sampler with a view to the Improvement of Temperature Observation. Journal du Conseil. III, 3.

[2]) J. R. Lumby and J. N. Carruthers, An Experiment dealing with the Interpretation of Salinity Distribution Charts. Journ. du Conseil. III, 2.

[3]) Verney Stott, An Apparatus for Determining the Salinity of Sea Water. Journ. du Conseil. III, 3.

surface samples were taken between the stations. Further observations were carried out by the "Augusta" between Heligoland and the coast at various times of the year.

In Holland the observations of surface temperature and salinity on the steamship routes and at Light Vessels were continued in the Southern North Sea without any alteration. The results obtained up to that time relating to the year's normal values of salinity were communicated to the Committee by Mr. Van Riel. The working up of the observations has been continued and extended to include a calculation of the monthly mean values and the compilation of monthly charts. This work which has now been concluded will be published in the "Journal du Conseil".

Norway. Temperature observations were obtained and water samples collected from steamships plying on the routes Stavanger—Rotterdam and Stavanger—Newcastle.

Scotland. Observations were made throughout the haddock excursions in May, July, and October in the north-western part of our area.

TRANSITION AREA
1928.

By

A. C. Johansen.

The main investigations carried out during the year 1928 in the Transition Area have concerned Plaice, Flounder, Cod, Haddock, Herring and Sprat.

As regards the Plaice the following points have been subjected to special investigations through co-operative work.

1) The age-composition in the catches of marketable plaice in the Kattegat, the Belt Sea and the Western Baltic.
2) The variation from year to year in the abundance of the youngest year-classes.

It was noted that the year-class 1925 constituted a very great item in the catches of marketable fish both in the Belt Sea, the Western Baltic and the Arcona Basin.

The year-class 1928 was rather sparsely represented in the southern Kattegat and Belt Sea, whereas in certain parts of the Baltic proper, such as the Køge Bay, the coastal waters south of Møen and the east-coast of Bornholm, proportionately many plaice of the 0-group were found. Several specimens of the 0-group were taken far from the coasts in the Arcona-Basin and on the Oder Bank in the month of August. It was confirmed that the year-class of 1927 was relatively abundant in the southern Kattegat, the Belt Sea and the western part of the Baltic proper. On the Oder Bank many specimens of the year-class 1927 were taken.

A report on the investigations in the Transition and Baltic Areas was laid before the International Council at the meeting in Copenhagen in June 1928. (Rapports et Procès-Verbaux des Réunions Vol. XLVIII. 1928). This report contains the following papers concerning the plaice:—

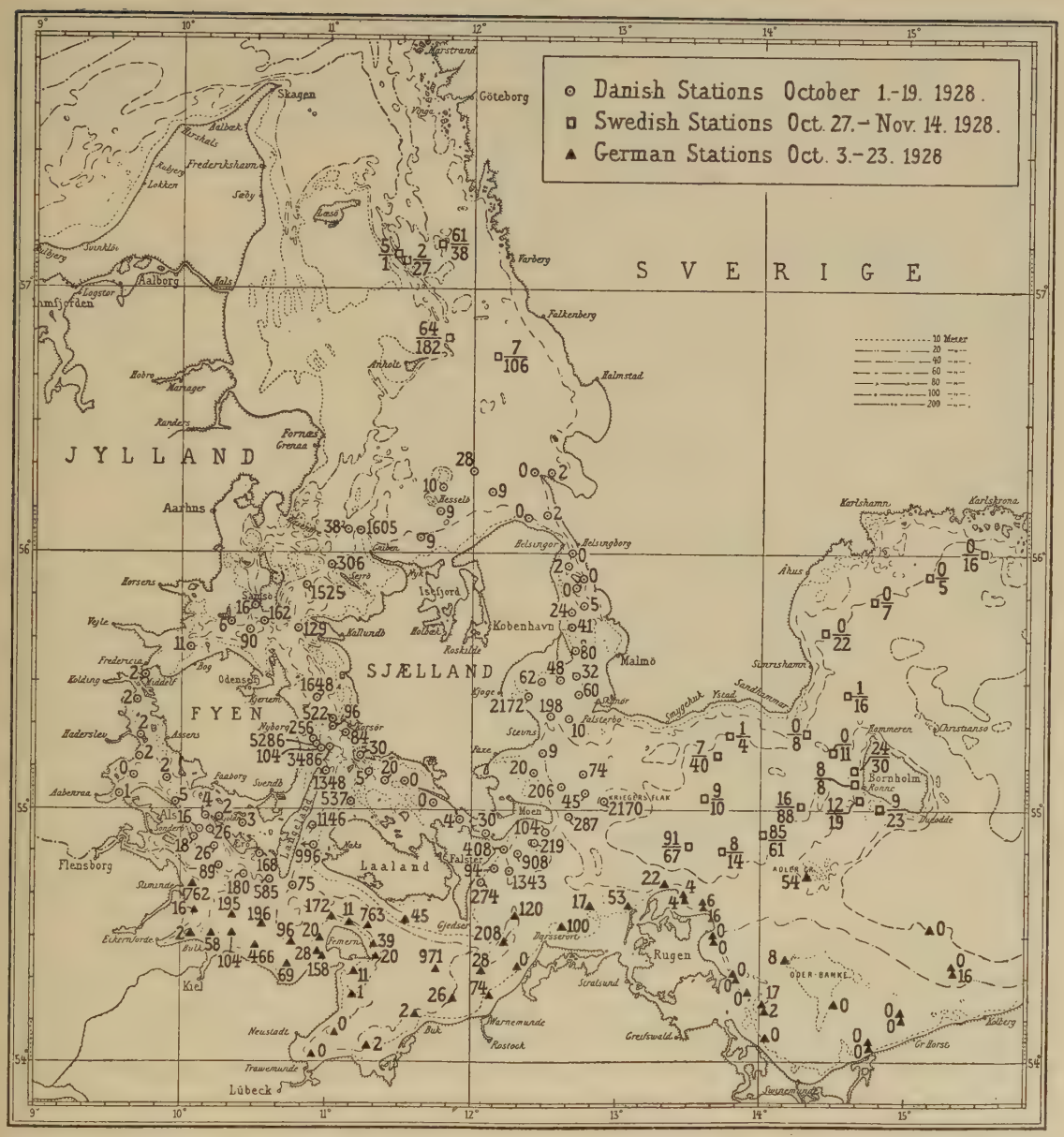
K. A. Andersson and Arvid R. Molander. The plaice fishery in the Arcona Basin and the Bornholm Area (southern Baltic) during the period 1921—1927.

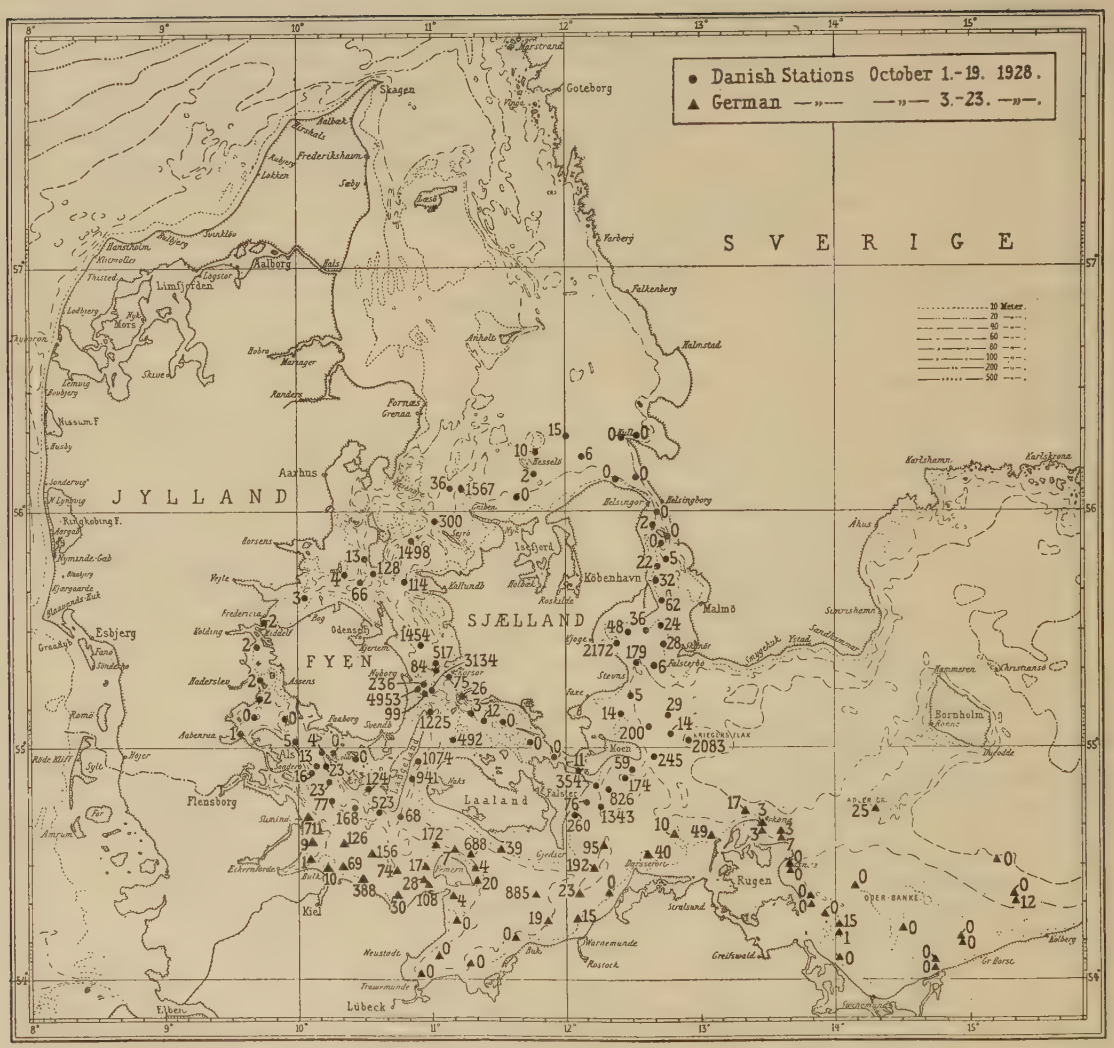
H. Blegvad. On the influence of the fishery upon the stock of plaice in the Baltic proper.

A. C. Johansen. On a proposed close season for the plaice fishery in the Belt Sea and the Baltic.

S. Strodtmann. The state of the plaice fishery in the Western Baltic and the Baltic proper.

The co-operative work regarding the Herring has mainly consisted in a uniform and contemporaneous research for larvae in order to locate the main spawning places and follow the variations in the frequency of the larvae from year to year.


Danish Stations October 1.-19. 1928.
Swedish Stations Oct. 27.- Nov. 14. 1928.
German Stations Oct. 3.-23. 1928
SVERIGE
JYLLAND
SJÆLLAND
FYEN
Laaland
Rugen
Skagen
Göteborg
Aalborg
Aarhus
Kobenhavn
Malmö
Flensborg
Kiel
Lübeck
Rostock
Warnemünde
Gedser
Darsserort
Falsterbo
Hallands Väderö
Falkenberg
Halmstad
Varberg
Karlskrona
Karlshamn
Ystad
Simrishamn
Bornholm
Ronne
Hammeren
Christiansø
Skt. Peters Bank
Adler Grund
Oder-Bank
Stolpe Bank
Gr. Dorse
Stralsund
Greifswald
Swinemünde
Kolberg
Trawemünde
Neustadt
Buk
Eckernförde
Apenrade
Hadersley
Fredericia
Veyle
Esbjerg
Ribe
Randers
Grenaa
Frederikshavn
Hirtshals
Lökken
Thyboron
Nissum Fjord
Limfjorden
Sæby
Læsø
Anholt
Hesselø
Helsingør
Helsingborg
Roskilde
Kallundb
Kalundb
Korsør
Nyborg
Svendb
Assens
Odense
Middelf
Faxe
Stevns
Moen
Falster
Ertholm
Ertholmene
Christiansø
Hammeren
Ronne
Bornholm


• Danish Stations October 1.-19. 1928.
▲ German —»— —»— 3.-23. —»—.
S V E R I G E
J Y L L A N D
F Y E N
S J Æ L L A N D
Laaland
Rugen
København
Aarhus
Esbjerg
Flensborg
Kiel
Lübeck
Rostock
Warnemünde
Greifswald
Malmö
Helsingborg
Helsingør
Falkenberg
Halmstad
Karlshamn
Karlskrona
Ystad
Simrishamn
Bornholm
Gjedser
Stevns
Faxe
Moen
Falster
Langeland
Fünen
Als
Sønderborg
Apenrade
Hadersleb
Ribe
Esbjerg
Fredericia
Vejle
Kolding
Aalborg
Frederikshavn
Skagen
Hirtshals
Thisted
Limfjorden
Mors
Nissum F.
Ringkøbing F.
Lemvig
Hvide Sande
Nymindegab
Esbjerg
Grenaa
Randers
Aarhus
Anholt
Læsø
Skive
Viborg
Silkeborg
Horsens
Kolding
Vejle
Fredericia
Middelfart
Odense
Svendborg
Nyborg
Korsør
Roskilde
Kalundborg
Holbæk
Isefjord
Kattegat
Skagerrak
Kriegers Flak
ADLER GR.
ODER-BANKE
Gr Borse
Kolberg
Trelleborg
Ystad
Sandhammer
Christiansø
Hammeren
Utklippan
Göteborg
Marstrand
Varberg
Falkenberg
Halmstad
Ängelholm
Helsingborg
Landskrona
Malmö
Trelleborg
Ystad
Simrishamn
Karlshamn
Karlskrona
Åkus
Öland
Gotland
Visby
Hoburgen
Fårö
Gotska Sandön
Stockholm
Nynäshamn
Oxelösund
Norrköping
Söderköping
Motala
Vättern
Vänern
Karlstad
Arvika
Kristinehamn
Örebro
Hallsberg
Mariestad
Skövde
Lidköping
Falköping
Jönköping
Nässjö
Eksjö
Vetlanda
Växjö
Alvesta
Ljungby
Hultsfred
Oskarshamn
Västervik
Kalmar
Nybro
Karlshamn
Karlskrona
Ronneby
Sölvesborg
Kristianstad
Hässleholm
Kristianopel
Torsås
Mönsterås
Figeholm
Blekinge
Småland
Östergötland
Södermanland
Uppland
Västmanland
Dalarna
Värmland
Närke
Västergötland
Dalsland
Bohuslän
Halland
Skåne
Gotland
Öland
Gotska Sandön
Fårö
Hoburgen
Utklippan
Hammeren
Christiansø

Denmark.

The Research Vessels at disposal for the investigations were as follows:— s/s "Japetus Steenstrup" — from beginning of April to November. A motor boat — from the middle of July to the middle of September.

Plaice.

A series of fishing experiments with a small otter-trawl (Eel-tog) were carried out from s/s "Japetus Steenstrup" in the Kattegat, Belt Sea, Western Baltic and Bornholm Waters during the months May—September. The greatest catches of marketable plaice were taken in the north western Kattegat. The catches here consisted mainly of specimens of the year-classes 1924, 1925 and 1926.

Fishing experiments from motor-boat with a small fine meshed plaice trawl took place close to the shores of the western and southern Kattegat, the Belt Sea and western Baltic from the middle of July to the middle of September. The year-class 1928 was on the whole sparsely represented.

In the month of April and commencement of May a series of experiments with introducing young plaice from the Limfjord and the North Sea to the southern Kattegat, Belt Sea and western Baltic took place[1]). The transplantation comprised about 1,430,000 fish. In order to obtain information as to the growth and migrations etc. of the fish planted, 3,000 of these fish were marked at 30 different places where liberation took place. In addition 490 plaice were marked at the places where they were captured in the inner Danish waters. The aim of these two series of experiments was to ascertain whether there are any differences between these two groups of fish as regards growth, migrations and mortality.

The marking experiments have shown that the transplanted plaice of 20—26 cm. length have had a very quick growth, viz. 10—11 cm. in the period from April—May to the end of the year. This growth was ca. 3 cm. greater than that observed in the Baltic plaice of the same size in the area in question.

The transplanted marked plaice have been rather stationary. Only in a few cases have long migrations towards the Kattegat or Skagerak been observed.

There has been a marked difference in the percentage of recaptures in the two series of experiments. Until the end of December 1928 the following percentages of the marked fish were recovered:—

	Transplanted marked fish	Local Baltic plaice marked
West of Samsø	8 per cent.	12 per cent.
Dalby Bay (N. of Funen)	27 - -	50 - -
Musholm Bay (W. of Sealand)	13 - -	20 - -
Karrebæksminde (S. of Sealand)	20 - -	70 - -
Kirkegrund (S. of Sealand)	8 - -	67 - -
South of Møen	3 - -	34 - -
Average...	c. 12 per cent.	c. 41 per cent.

[1]) Comp. Journal du Conseil. Vol. III. Nr. 3. 1928.

The great difference in the percentage of recoveries suggests that the mortality caused by other factors than fishing operations has been far greater in the transplanted fish than in the local Baltic plaice.

The constancy of the racial characters of the Baltic plaice has been studied and a paper on this subject was read by A. C. Johansen at the Council Meeting in June 1928 in Copenhagen. The racial investigations in the summer of 1928 have shown that a considerable transport of plaice larvae from the Kattegat to the Belt Sea and Baltic proper has occurred in 1928.

Flounder and Dab.

During the fishing experiments with Eel-tog a great deal of flounder and dab were caught. Most of these were measured, and a part of them were analysed as regards sex, age, maturity and contents of food. Dr. Blegvad has begun a special study in order to distinguish the two youngest year-classes of the dab from each other by means of otoliths and scales.

The importance of the dab as a food fish is increasing in Denmark year by year, and the dab in the Kattegat, Belt Sea and western Baltic seems now to reach a larger size than formerly.

Cod.

Experiments with ring-trawl were undertaken in May and June in the Kattegat, Belt Sea and Western Baltic in order to ascertain the frequency of the cod-larvae.

Fishing experiments with the Eel-tog were carried out in May—August with the object to investigate the composition of the stock of cod. The analyses carried out concerned lengths, age, maturity and food. The year-class 1928 was very rich in the Isefjord, but not so abundant in the Belt Sea as the year-classes 1923, 1925 and 1927.

Haddock.

The investigations of the Haddock in the Belt Sea and Western Baltic have been continued in 1928, and the following paper has been published on this subject: Erik M. Poulsen: "The Haddock in the Belt Sea and the Western Baltic during the years 1926—1928" (Report XXXIV from the Danish Biological Station 1928). It has been shown in this paper that during a great inflow of salt bottom water from the Kattegat and Skagerak in June and July 1928 a quantity of haddock larvae was introduced into the Belt Sea.

Herring.

The studies of the Herring races in the Transition Area have been continued. In connection with these studies Erik M. Poulsen undertook from October 1st—19th a series of fishing experiments with ring-trawl and Hensen net in the southern Kattegat, Belt Sea, Western Baltic and Baltic proper in order to locate the spawning places of the autumn-spawning Belt Herring and the West-Baltic Herring. (Comp. Fig. 1 and Fig. 2).

Sea Trout.

Special investigations have been carried out in Randers Fjord and Mariager Fjord concerning the size and age of the Sea Trout taken in these waters.

Valuation of the Sea Bottom.

Quantitative investigations on Bottom-invertebrates have been carried out in certain localities of the Belt Sea and the Baltic proper.

Plankton.

A series of vertical hauls with the Hensen net were carried out in connection with the investigations concerning the frequency of the herring larvae in the autumn of 1928.

Hydrography.

In continuation of the hydrographical investigations hitherto carried out measurements of temperature, salinity and content of oxygen have been made in connection with the biological investigations of the Danish Commission. The observations will be published in the Bulletin Hydrographique.

From the lightship "Gedser Rev" an experiment with drift bottles was made in the autumn of 1928.

Measurements of temperature and salinity at different stations at the coast and from the Danish lightships at different depths have been made by the Danish Meteorological Institute and are published in the nautical annual report of the Institute.

Germany.

The German investigations in the Transition Area have mainly concerned Flat-fishes (Plaice, Flounder, Dab) and Herring. The investigations of the Flat-fishes were restricted to analyses of the fish landed in the more important harbours of Pomerania.

Plaice.

The catches in the Arcona Basin and the waters east of Rügen were very small. The year-classes 1923 and 1925 were relatively abundant, but the greater part of the year-class 1923 was already fished away. The stock of old plaice in the Arcona Basin has almost wholly disappeared. A very important part of the catches consisted of immature fish of the year-class 1925 and during the autumn also of fish of the year-class 1926.

Flounder and Dab.

The catches were smaller than in 1927. For these two species we begin to note the same phenomenon as we have for several years observed in the plaice, that the stock of old fish is decreasing and the rate of growth increasing.

Herring.

Dr. Altnöder and Dr. Schubart on behalf of Prof. Henking undertook in the period from October 3rd—23rd, 1928, a special expedition with a motor cutter in order to locate the spawning places of the autumn spawning Herring in the Western Baltic, the southern part of the Arcona Basin and the Pomeranian Bay. On the cruise 58 ring-trawl stations were taken. The greatest number of young larvae were taken between Buk and Gedser, in the Fehmarn Belt and off Schleimünde. No larvae were caught in the Lübeck Bay south of the line from Buk to Dahme, and very few larvae were taken in the Pomeranian Bay.

A paper of Dr. Altnöder (with an introduction by Prof. Henking) on racial studies of the Herring in the western and southern Baltic and the occurrence of larvae of autumn herrings in these waters in the autumn of 1927 has been published (K. Altnöder: Untersuchungen an den Heringen der westlichen Ostsee. Berichte d. deutschen wiss. Kommission für Meeresforschung. N.F. Bd. IV. Heft 3. 1928).

Norway.

Mr. Bjerkan has continued his studies of the Sprat (*Clupea sprattus* L.) and has collected a series of samples with the object to follow the variations in the composition of the stock. During the fishing period from May to August 1928 ca. 30 samples were collected in Oslo Fjord and the Hvalör area, and later in the year some samples of young fish from the area near Arendal was procured. The samples taken from the fishermen's catches showed that the year-class 1927 was quite dominating during the early summer while the older year-classes were very sparsely represented, keeping probably in deeper water. The older year-classes occured, however, in the catches from August and later. In the year-class 1927 different size groups occurred, which suggest a spawning time of long duration.

Racial investigations on young sprat of the year-class 1928 show that these had a higher number of vertebrae than those of the year-class 1927, namely on an average 48.7 against 48.0. The high values for the year-class 1928 were also observed in several samples from the Norwegian west-coast. In two samples of sprat of different year-classes from the Gulmar Fjord the average number of vertebrae was only 47.77 and 47.68, respectively (100 specimens in each sample).

Some samples from the Limfjord consisted of different year-classes (1925, 1926, 1927 and 1928). The growth of the Limfjord sprat seems to have been small after their third year.

During a seven weeks' cruise with the M/C "Havdrön" from the beginning of June to the middle of July in the Norwegian sprat area, some work was carried out in the Transition Area from July 3rd—11th. Observations regarding temperature and salinity were made, samples of plankton were taken, and samples of sprat from the fishermen's catches were investigated. The work was mainly restricted to Oslo Fjord and the Hvalör area, where the fishing for sprat took place from the end of May to August—September. The investigations in the beginning of July showed a low tem-

perature, very much phytoplankton and very little copepodplankton in the upper layers. In the bottom of the Fjord the small Copepods and *Evadne* were well represented. The hydrographical and biological conditions were such that the small sprat kept in shallow waters near land while the older year-classes occurred in the deeper layers where the zooplankton was richer.

Herring.

Mr. Lea has continued his investigations of samples of young herring from the coastal waters east of Lindesnæs. He reports that his examinations prove the presence of non-Norwegian herrings.

Cod.

Director Dannevig has made investigations on the cod in the coastal waters near Arendal as regards frequency, age and growth. The experiments with rearing of cod larvae have been continued[1]).

Lobster.

Dannevig has continued his experiments with rearing of lobster larvae at Flødevigen. In 1928 there were reared 50187 young lobster to the bottom stage (4th stage), that is 34 per cent. of the fry used in the experiments[2]).

Sweden.

The Research vessel "Skagerak" was kept in commission for the greater part of the year. The following is a brief outline of the cruises accomplished in this area and the main object of the work in the different parts of the year.

January—February: Distribution and frequencies of herring in the Kattegat and Skagerak in order to assist the fishermen in finding the herring-shoals.

March—April: Trawling in the Kattegat and Skagerak for studying the stock of haddock and witch and the stock of plaice in the inshore waters.

July: Trawling experiments for witch in the Skagerak and Kattegat.

August—October: Current measurements and other hydrographical observations in the Skagerak, Kattegat and the Baltic.

November: The distribution and frequencies of young larvae of herring and the 0-group of plaice and flounder in the southern Baltic. Studies on the stock of plaice and flounder.

December: Studies on the stock of herring and haddock in the Kattegat and Skagerak.

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[1]) Alf Dannevig: Die Kultur von Meeresfischen in Norwegen. Mitt. d. Deutschen Seefischerei-Vereins. 1928.

[2]) Alf Dannevig: The rearing of Lobster-Larvae at Flødevigen. Report on Norwegian Fishery and Marine Investigations. Vol. III. Nr. 9. 1928.

Idem: Hummerkultur. "Naturen". Oktober 1928.

Herring.

At many stations in the southern Baltic and in the Kattegat investigations were made in November in order to ascertain the distribution and frequencies of young herring larvae.

Several samples of herring from the Kattegat and Skagerak were examined. It may be mentioned that the catches of herring were rather rich in the Kattegat during December and that the catches to a large extent consisted of winter-spawning Kattegat herring.

Plaice.

At the zoological station in Kristineberg on the westcoast of Sweden Dr. Molander has during the two last years made a series of experiments in order to ascertain the influence of the temperature and salinity on the rate of growth of plaice and on the forming of winterrings. Through these experiments he has been able to state that a constant low temperature retards the growth to a high degree and that the winterrings are formed, although the individuals under experiment were kept in quite the same temperature and salinity and in the same conditions of nourishment during two years.

In order to locate the spawning places of the plaice and to study the migration of plaice larvae of the inshore waters rather extended investigations were carried out in the spring off the Swedish westcoast as well as in the fjords.

In November many trawling experiments were carried out with the small young fish trawl of the same type as used by Dr. A. C. Johansen, in shallow water in the Baltic on the south and east coast of Skåne and on the coast of Blekinge. Young plaice of the 0- and I-groups were caught, but not in great numbers, on the south and east coast of Skåne, but not on the coast of Blekinge. The density was greatest in the area off Sandhammaren on a sandy bottom.

On the same cruise material was collected in order to study the stock of plaice in the Bornholm region.

Flounder.

Great attention has been paid to the keeping of a record of the character of the stock of flounder in the southern Baltic, so that any changes occurring in it may be traced. Trawling experiments, therefore were carried out in the Bornholm area and a great deal of material has been collected. This has not yet been worked out.

By trawling with the small young fish trawl for the purpose of obtaining plaice larvae a great number of young flounder, 0- and I-groups, was caught on the coast of Skåne and Blekinge in shallow waters. They were most crowded off the coast of Blekinge, where several hundreds were caught in a single short haul.

Witch.

Through trawling experiments it has been ascertained, that a small stock of witch exists in the Kattegat and ripe spawners have been caught in this area in July—

October, but hitherto we have not been able to catch any larvae in the Kattegat. On the whole, the occurring of a stock of witch in this water is somewhat mysterious. By age determinations it is found that the witch in the Kattegat has a more rapid growth than in the Skagerak and the North Sea. The stock in the Kattegat consists only of a few year groups. During the years 1925—1928 the year group from 1922 formed a great deal of the stock (1925: 28.4 per cent.; 1927: 33 per cent.; 1928: 35.5 per cent.).

Racial investigations have also shown some difference between the witch in the Kattegat and Skagerak. As regards the number of vertebrae the investigation of two samples gave this result.

	Number of individuals	Mean number of vertebrae
Kattegat	101	56.86
Skagerak	195	57.45

Investigations have also been made in order to study the influence of the size limit of 30 cm. imposed for witch in April 1927.

In 1927 some hundred specimens were marked, but no one of these has yet been recaptured.

Haddock.

Great attention has been paid to the study of the stock of haddock in the Kattegat and Skagerak. A large number was measured from the landings in the fishing harbour of Gothenburg and from the catches made by the "Skagerak". Age-determinations were made on an adequate scale. These investigations show, that the year-class of 1926 was very rich and quite predominated in the year under review. In January and February 1928 this year-class occurred in the catches as "extra small" with an average length of 26—27 cm., right up to more than 90 per cent. in the catches. In December 1928 the same year-class had grown up to an average length of 32—33 cm., "small" and "medium" haddock.

This strong year-class increased also to a high degree the total landings of haddock to the fishing harbour in Gothenburg, as will be seen from the following figures on the total catches landed in the above harbour during 1925—1928.

Year	Tons
1925	3,817
1926	3,744
1927	4,678
1928	7,454

The results of these investigations up to date have been reviewed by Dr. Molander and will be presented to the Committee for consideration.

Marking experiments on the haddock were carried out but no marked specimens have been recaptured.

The fishermen have strongly urged, that a size limit for haddock should be imposed and it is proposed that haddock smaller than 32 cm. in total length should not be landed in Sweden. This proposal is now under consideration by the Government.

Hydrography.

In connection with the biological investigations hydrographic observations were made as to the salinity and temperature. A great deal of work has been expended for current measurements in the Baltic, the Kattegat and the Skagerak and in the fjords of Bohuslän as well.

BALTIC AREA
1928.

By

K. A. Andersson.

The following work was carried out in the Baltic Area during the year 1928 by the different countries:—

Denmark.

Biology.

In August of 1928 a series of fishing experiments were carried out from the steamer "Japetus Steenstrup" in the waters to the South and East of Bornholm in order to investigate the stock of plaice, dab and cod. The plaice caught were subjected to age-analyses and racial investigations, and the cod were analysed with regard to age, maturity and food-contents. The main food found in the stomachs of cod of 8—20 cm. length (0-group and I-group) was *Mysis* and *Gammarus*. In one specimen of the I-group of 16 cm. length a *Salmo trutta* of 4 cm. was found. The cod of 30—50 cm. length had *Mysis* in the stomach as a rule, and some of them *Gammarus*, *Diastylis*, *Nemertines*, *Harmothoe*, *Macoma calcarea*, *Lumpenus lampetriformis* etc. A female of 38 cm. (III-group) and a male of 41 cm. (V-group) were just in the spawning stage. In some experiments with ring trawl a few larvae of *Clupea sprattus* were caught.

In the coastal waters east of Bornholm fishing experiments with push net (Rejehov) were carried out in order to catch specimens of the 0-group and I-group of plaice. In the course of two hours two men captured 96 specimens of the 0-group of 3—5 cm. and 12 specimens of the I-group of 7—12 cm. length. Whilst in the plaice of the 0-group and I-group caught in the Arcona Basin there was a distinct admixture of plaice from the Kattegat, the plaice taken in the coastal waters east of Bornholm were pure Baltic plaice with about 50.00 anal fin rays in mean value.

A few samples with Petersen's Grab were taken in the Bornholm Deep.

Hydrography.

Observations of temperature, salinity and oxygen were made in the waters at Bornholm. The observations will be published in the Bulletin Hydrographique.

Observations of temperature and salinity were made at the surface at Christianso by the Danish Meteorological Institute and are published in the nautical annual report of this Institute.

Finland.

Biology.

Material for scale-analysis of Salmon from the Kemi, Oulu, Kymi and Kokemäki rivers were collected and marking of young Salmon in Kokemäki river was carried out.

Hydrographical work.

1) Regular continual observations were made in the following ways:—
   a) Surface-temperature daily, surface-salinity every 5th day, temperature and salinity at different depths every 10th day from 26 coast stations and at 11 lightships.
   b) Surface-observations on liners from Finland to Denmark.
   c) Currents at three depths three times daily from 11 lightships.
   d) Oxygen in deeper layers at Märket three times a month.
   e) Registrations of sea-level at 14 coastal points.
   f) Records of ice conditions in journals and sketch maps at about 100 stations.
   g) Records of ice conditions in the Baltic on all Finnish ships.
2) A hydrographical cruise was made in July 1928 in the Baltic north of Gotland, at which 71 stations were taken. On this cruise chemical work comprising determination of oxygen, hydrogen-ion-concentration, alkalinity, nitrogen-compounds (ammonia, nitrate, nitrite) and phosphates were carried out.
3) Laboratory work regarding chemical methods of analysis of water- and bottom-samples was made.
4) The analyses of bottom-samples from the Baltic were continued.
5) Echo-soundings were systematically made on lines covering the Åland-Sea, the South Quarken, the Northern Quarken and the southern part of the Gulf of Bothnia.

Germany.

The investigations during the year under review comprises mainly the flatfish fishery in the middle part of the Baltic and consisted of investigations of the landed fishes and of statistical work at the harbours of East and West Pomerania (Sassnitz, Swinemünde, Dievenow, Kolberg). The investigations had to be carried out in this territory as the centre of gravity of the motor trawl (Zeesen) fishery has been shifted from the western part of the Baltic to the waters of East and West Pomerania, which waters supplied $^{9}/_{10}$ of the flatfishes landed at the Baltic coast of Germany during 1927.

The Bornholm fishing was studied during some weeks at Kolberg which place besides Sassnitz and Swinemünde is the most important harbour of Pomerania. Samples of catches were analysed and from the account books of the fish dealer corporations extracts were made illustrating the course of the fishery since the year of 1924. It was found, that the share of the Bornholm fishery of the annual total landings is very considerable; it increased up to the year of 1927 and amounted during this year to about $^{1}/_{3}$ of the total landings (27 per cent. of the plaice and 38 per cent. of the flounder) which certainly indicates a record with regard to the number of journeys as well as the average catch per journey and the total yield. The largest quantities were landed during March

and April; the catches consisted to $^2/_3$ of flounder, the last third comprised plaice and dab, but the quantities of plaice showing a successive decrease from year to year. The animals were very badly nourished, their weight being 10—20 per cent. lower than normal. Length- and age-determinations showed, that the slow-growing old stocks had been greatly diminished. Statistical investigations at Dievenow verified these experiences and one is probably not wrong in supposing, that this holds true along the entire coast of Pomerania.

After the Bornholm-catches had been excluded one was able to follow the course of the summer- and autumn fishery at the inshore fishing grounds. After an increase at the beginning of the period this fishery shows a marked decrease, which as regards the plaice fishery began in 1925 and the flounder fishery a year later. Up to 1928 the Kolberg landings show a decrease of 55—45 per cent. respectively. This decrease is nearly compensated by the larger supply from the Bornholm Basin and consequently the quantity of the annual total landings are fairly constant. Therefore, this change may be especially pointed out!

After the Bornholm fishery had been finished — it was going on from Sassnitz as late as during the beginning of July, which may be considered as a striking evidence of the poorness of the inshore waters — the fishery was principally confined to the coastal districts in the neighbourhood of the Oder Bank at a depth of 10—20 m. The course of development, due to the intense fishery, which the stock of flat fishes has undergone during recent years, has continued. Briefly, the results of the investigations during this year are as follows:—

In comparison with the earlier years the plaice fishery supplies a great number of small fish but few large ones. The state of nourishment of the animals is very good during summer and autumn and their quality has been considerably increased in comparison with that found during earlier investigations. This is undoubtedly a result of the rarefying of the stock, which manifests itself by a more rapid growth of the animals. The III-group attains already during the summer length of more than 30 cm. The percentage of the different age groups is completely changed. The very old individuals in the stock of the Arcona Basin have disappeared, the stock which gather in the Bornholm Basin for spawning is very much rejuvenated, the number of the slow growing very old males being decreased. The older age groups fail to appear at the inshore fishing grounds down to a depth of 20 m, consequently the fishery here is confined to a utilization of the youngest catchable year groups, (III-group) and during the autumn it includes — favoured by the low minimum size — also the next younger year group (II-group) which during 1927 was landed in large quantities at the Swine harbours. Especially remarkable are the indications of a fluctuation of the stock of plaice; according to the amount of the youngest year class at each time the years of 1923 and 1925 manifest themselves as good fry years.

The flounder fishery, the backbone of the Pomeranien fishery, has been a disappointment during this year; the yield of this fishery seems to have been very much inferior to that of the preceding year. The stock shows in a smaller degree the same changes as that of the plaice, consequently a relative decrease of the older year groups

and as a consequence of the decrease of the density of the population a greater rate of growth of younger animals. It is considerably damaged by the Bornholm fishery at which the older animals are caught and brought on the market, yielding a price without any proportion to the value of the fishes, if they were caught during a more favourable season. The summer- and autumn-catches from the inshore waters consist almost exclusively of the age-groups III—V of which the IV-group predominates.

The economic value of the dab is steadily increasing. Of this fish, to which formerly hardly any attention was paid, the quality has been very much improved, which certainly is due to the less intense competition for the food. During the spring months when the plaice and flounder are spent and of little value, the dab is greatly estimated as raw product for the smokehouses.

About half the dab catches from the Bornholm Basin were landed at Kolberg; in Sassnitz dab from the Bornholm and Arcona Basins were willingly bought as late as during the beginning of July. The increasing estimation of this fish indicates the change of the entire stock of flatfishes.

The working-out of the results of the investigations is soon completed, and a paper on the subject is to be published in "Berichten der Deutschen Wissenschaftlichen Kommission für Meeresforschung".

Herring.

In the period from the 3rd to the 23rd October a cruise was made in the southern Baltic from Kolberg to Schleimünde in order to ascertain the distribution and stock of young herring larvae. In the eastern part of the region investigated (in the Oder Bank region) only very few herring larvae were caught. A more full report is given under the heading of the Transition Area Committee.

Latvia.

Statistics.

Statistical work has been regularly continued for 72 districts. Data are received about: number and value of fish landed, number of fishermen, number of fishermen perished at their work, number and value of boats and fishing tackle, number and value of fishing tackle lost at sea. Information is also compiled about the number of seals killed in every district.

The data for 1927 are published by the Ministry of Agriculture in the fourth statistical yearbook, edited by Mr. V. Miezis "Bulletin statistique des pêches maritimes de Lettonie — Année 1927". The data for 1928 will be published shortly.

Biological work.

The measurements of salmon and the collection of salmon scales have been carried out at the salmon hatcheries of Salace (Salis) and Koknese (Kokenhusen). The examination of scales collected is continued at the Ministry's Fishery Laboratory. 300 young salmon a year old were marked with a small round silver plate with the letter

"L" and numbers and put in the river Venta (Windau) at Skrunda (Schrunden). The investigations of Coregonidae in the Gulf of Riga have been continued at the Fishery laboratory by Mr. W. Mannsfeld and are ready for publication. In the Gulf of Riga 3 forms of *Coregonus lavaretus* have been found: *C. lavaretus* f. *polonica* Kulmatycki, *C. lavaretus* f. *typica* Thienemann and a third form being closely related to the *C. lavaretus* f. *generosus* Bloch.

Investigations have also been carried out as to the distribution of the several flatfishes along the Latvian seashore. At Liepaja (Libau) the flounder catches contain up to 1 per cent. of *Pleuronectes platessa* and *P. limanda*. The occurrence of the last one was found as far as Užava (Hasau) in the south of Ventspils (Windau).

The collection of plankton from ships along the Latvian seashore in the Baltic and the Gulf of Riga has been continued and the examination of samples collected is carried out at the Hydrobiological Station of the Latvian University (Dir. E. Strand).

A Committee has been appointed by the Municipality of Riga to investigate the influence of the town of Riga on the pollution of the river Daugava (Düna). In the Committee are participating the representatives of the Riga Municipality, the Fishery Laboratory and the Latvian University.

Hydrographical work.

Regular observations regarding the height of the water level and the surface temperature are carried out at Liepaja (Libau), Ventspils (Windau), Kolka (Domesnäs) and Daugagriva (Dünamünde) by the Hydrographical Department of the Ministry of Finances.

Observations regarding the ice conditions have been made from coast stations and lightships by the State Meteorological Bureau (Ministry of Agriculture).

The collection of water samples from ships along the Latvian seashore in the Gulf of Riga and the Baltic has been continued by the Hydrobiological Station of the Latvian University.

Poland.

Hydrography.

a) Surface temperature was measured twice daily near the port of Gdynia.

b) At one point, 1 km distant from Hel, temperature was measured every 5th day on the surface and at the depths of 10, 20, 30 and 40 m.

c) Synoptic maps concerning the formation and movements of the ice in the Baltic were daily published by the State Meteorological Institute.

d) In connection with the study of the influence of the water carried into the Baltic by the Vistula, samples of water were taken, temperature measured and salinity determined at 26 points near the Polish coast and in the Golf of Danzig, at different depths, during 5 cruises in August and November. After examination of more than 100 samples from different stations 12 points in the Golf of Danzig were chosen for regular observations next year.

e) New maps of the Polish coastal waters were executed by the Military Geographical Institute on a scale of 1:25,000.
f) Constant observations concerning the quantity and the quality of water carried into the Baltic by the Vistula were carried out.

Statistics.

Figures were collected in the usual way concerning the fish landed at different ports of the Polish coast, and its economical value. An attempt was made to establish the results of one hour fishing with different fishing-gear.

Fishery investigations.

a) With the object of studying the distribution of flatfish, marking experiments with flounder and common dab were made. About 1000 fish of both species were marked.
b) Materials for the study of the food of flatfish near the Polish coast were collected.
c) With the object of determining the rate of growth and with a view to establishing a rational minimum size of flounder and common dab near the Polish coast, scales and otoliths of more than 1000 flatfish were studied. The preliminary results of this investigation seem to indicate, that the rate of growth of these two species of flatfish is unusually rapid.

It seems probable that the rapid rate of growth is in connection with the diminution of the density of population of flatfish, and that this diminution is a consequence of intensive fishing.

d) The influence of the winds upon the fishery near the Polish coast was studied.
e) Studies on the races of the herring in the Baltic sea were carried on.
f) Studies upon young eel (Aalmontée) were carried on, with a view to determining the average weight of individuals.

Studies on the destroying power of the ordinary industrial trawls.

Small trawls of 11 different types used by the fishermen from the Polish coast were studied in respect of their destroying power. About 30,000 flatfish caught in 78 hauls were measured and another 15,000 measurements from 1927 were included in this study.

The results of these studies are as follows:—

a) The dimensions of the meshes in the trawls decide the destroying power of the gear (e. g. the 40 mm meshes let through flatfish under 16 cm, the 45 mm meshes those under 18 cm etc.). The speed of trawling is also of great importance for the destroying power of the trawl.
b) The fish below the allowed minimum length form in general a very important part (up to 40 per cent.) of the total catch. They are often destroyed before landing; therefore the statistics, based upon the quantities of landed fish, give no correct idea of the destroying power of trawls.
c) The character of the population of flatfish has also a great influence upon the results of trawling.

Studies upon the Saving trawls.

Two series of experiments were made.

a) Flatfish were placed in the middle part of large basins divided into 3 parts by nets with meshes of different dimensions and extended in different directions. Afterwards the fish were forced to escape from the middle part through the nets. The experiments have demonstrated the importance of dimensions of meshes for the saving trawl and also that meshes extended horizontally are most suited for allowing the fish to escape. Vertically extended meshes of the same dimensions are the most serious obstacle for the fish. The quadrangular meshes prevent the fish from passing through though they easily pass through horizontally extended meshes of the same dimensions.

b) Trawls of 8 different types were constructed in order to study which part of the trawl is more important in saving undersized fish. Nets with meshes of different dimensions were placed in the frontpart of the trawl, in the wings, in the codend in the upper part and in the lower part of different trawls. Different combinations of meshes in different parts of trawls were studied and compared. More than 70 hauls were made with these experimental trawls and more than 12,000 fishes from these hauls were measured and examined. These studies will be continued and the preliminary observations seem to indicate, that the side and bottom parts of the trawl have the greatest importance for the construction of a saving trawl.

Studies upon the Salmonid fish.

a) Marking experiments with sea trout were continued; 656 marked young sea trout, one, two or three years old, were put in the affluents of the Vistula river.

b) Two new hatcheries for salmon, one near Nowy Sącz, on the river Dunajec, another near Wilno on an affluent of the river Niemen begun their work. In general 2,370,000 sea trout and salmon eggs are now placed in hatcheries.

c) Hydrographical and biological conditions of the river Dunajec in that part, where the natural spawning places of Salmonids are situated, were continued.

d) Studies upon the morphology of salmon and sea trout were continued on the basis of examination of about 700 specimens.

e) Material for scale readings were collected.

f) Salmonid fish caught in the Baltic Sea by means of angles (tackles) and large driftnets were examined with the result, that mostly Salmon (*S. salar*) was observed in the industrial catches taken by those two kinds of fishing gear.

g) Statistical figures concerning the salmon fishery in the Vistula were collected.

h) Studies upon the occurrence of the furunculosis among the salmonids were begun.

i) Studies upon hybrids of salmonids were continued.

Studies upon Coregonid fishes.

About 350,000 of the eggs of the Baltic lavaret were put in the hatcheries in Puck.

Studies on the River Pollution.

a) A new station for experimental study of river pollution was organized in Varsaw. The programme of the work of this station contains *inter alia* the study necessary for the unification of methods for the study of water pollution.
b) Pollution caused by sugar-factories in the rivers Warta and Notec were studied.
c) Pollution of two affluents of the Vistula, important for the spawning places of salmonids were studied.

Sweden.

During the year 1928 the investigations were carried out as far as possible in accordance with the programme adopted.

The Research Vessels.

Investigations at sea were made by the research vessel "Skagerak" and by the motorboat "Eystrasalt".

The following is the outline of the cruises accomplished and the main objects of each cruise:

With the "Skagerak":—

1) July: to the Baltic and the Gulf of Riga. The distribution and density of animal plankton and hydrographic survey.
2) November: to the southern Baltic. The distribution of broods of herring, plaice and flounder. Trawling experiments for plaice and flounder.

With the "Eystrasalt":—

July, September—October: along the Swedish coast. Plankton investigations and fishing experiments for flatfish and herring, the distribution of the 0- and I-groups of flatfish and the young herring larvae.

Herring.

During the cruise in July fishing experiments were made with a smallmeshed trawl and thereby rather good catches of herring were taken in several places. It may particularly be mentioned, that on the region off the northern eastcoast of Gotland herring were caught at the bottom at great depths from 60 down to 128 m. It is of great interest, that the herring in the daytime goes down to depths where the water layers are far from being saturated with oxygen. Spring spawners were taken in these depths as well as autumn spawners. They there feed on Mysis, which during the daylight live in the deep water. The herring was generally of a larger size in deep water than in shallow.

In the Gulf of Riga a haul with a finemeshed trawl in 48—50 m. also gave a catch of herring, but this was of a small size and belonged to a spring spawning race.

A number of samples of autumn spawning herring from different parts of the Swedish coast were collected and examined as to the age composition.

In the year 1927 it was shown, that the main part of the herring fishing was based in the southern Baltic on the year group of 1924 (3 years old) and in the middle Baltic on the year-classes of 1924 and 1923. These year groups were abundant in the catches 1928 in the same parts of the Baltic, but of course they were one year older. In a sample from Karlshamn in the southern Baltic the 4-years herring predominated with 72,4 per cent. and in two samples from Gotland the 4- and 5-year-classes predominated with 50.9 and 16.2 per cent. respectively.

In the Gulf of Bothnia the year-class from 1923 seems to predominate as in 1927, but during 1928 also the year-class from 1924 constitutes a great deal of the catches.

The year-classes referred to seem to be strong as the herring fishery along the Swedish coast has increased during the last year.

A great number of herring has been investigated as to their food in different parts of the Baltic.

In the autumn a great number of hauls with a 2-meter ringtrawl were made in the southern and the middle Baltic in order to know the stock and distribution of young herring larvae. In the middle Baltic off the coast of Småland the hauls were made in October in the neighbourhood of the spawning places. Though many experiments were carried out, only a few larvae were caught.

In the Bornholm region we worked in November and also there we caught only small numbers of herring larvae. But it may be noticed, that it is perhaps too late to conduct such investigations in November.

A report of the catches from the southern Baltic is given in the Administrative Report of the Transition Area Committee.

Sprat.

During the cruise in July eggs of sprat were collected in great numbers in different parts of the southern and middle Baltic. Thus we obtained good catches of sprat eggs to the north and to the east from Bornholm in deep water, in the Danzig Bay and at several stations east of Gotland.

Plaice.

On the cruise in November material was collected for further studies on the stock of plaice in the southern Baltic.

Flounder.

Investigations were carried out in the summer and the autumn in shallow waters on the southern Swedish coast and on the northern coast of Gotland in order to find the youngest year groups of the flounder. The young stages were found in great abundance on the coast of Blekinge.

On the shores of Gotland a number of the 0- and I- and II-groups were caught. The individuals of the 0-group caught on the 13th of September had a length of 25 to 52 mm with an average of 34.2 mm. The I-group caught the same day showed a length of 68—95 mm, average 80.5 mm. The rate of growth seems to vary in different localities on the coast of Gotland.

In the Bornholm region fishing experiments were made and material collected for the study of the rate of growth and the age composition.

Turbot.

In July fishing experiments for turbot were made with nets in shallow water in the southern Baltic and otoliths were collected.

Eel.

200 specimens were marked on the east coast of Gotland, three of which have been recaptured on the southeast coast of Sweden.

A paper dealing with the fish marking experiments in the Baltic during 1928 and previous years by Dr. Chr. Hessle has appeared in the Meddelanden från Kungl. Lantbruksstyrelsen Nr. 278 (Nr. 7 år 1929).

Salmon and Seatrout.

In order to study the age composition of the salmon and the variations of the year classes from year to year and their influence on the catches, samples of salmon scales have been collected as during previous years on the southern coast and from several rivers in the southern and northern part of Sweden.

The biology of the sea trout has been studied in several places on the Swedish mainland and Gotland. Marking experiments have also been performed.

Plankton Investigations.

On the same lines as during the previous years plankton investigations were continued at a great number of stations in different parts of the Baltic and in different seasons. A great material is now collected and will be worked out for publishing in the near future.

Hydrography.

In conjunction with the biological work hydrographic observations have been performed as to temperature and salinity. The oxygen content has been determined in greater depths.

Continual observations have been made from light-ships along the Swedish coast. Off the northwestern coast of Gotland these continual observations have been carried out down to a depth of 80—100 m.